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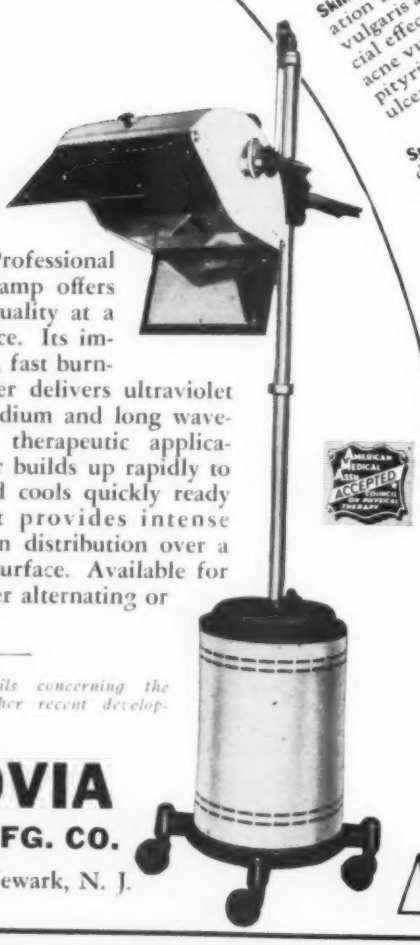

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PHYSICAL THERAPY IN EDUCATION AND RESEARCH

WILLIAM T. SANGER, M.A., Ph.D., LL.D.

President, Medical College of Virginia

RICHMOND

Even as a medical administrator I have been impressed with the growing interest in physical therapy as evidenced by the number of its publications, by the recent action of certain state medical societies, by the gradual increases in the number of courses, and in the amount of research in this field.

Notwithstanding these advances you well know there is a widespread lack of appreciation of this type of therapy due to a variety of circumstances. Education still remains the slow but sure way of developing enterprises in harmony with their possibilities. It would seem that those interested in giving physical therapy its rightful place in the care of the sick might well take a leaf from the experience of other workers.

Those of us who are active in medical education have noted the constructive effect of surveys of medical schools as to the extent and methods of teaching certain subjects, followed by reports and recommendations to all schools. So many subjects are competing for status in medical curricula, some of them with vigorous supporters, that tardy comers to the curricula meet with insufficient attention because of lack of able local advocates.

It has been interesting to observe, it might be said parenthetically, that when a department of physical therapy was proposed for a certain institution it was viewed askance by a number of leading staff members and subsequently to observe how quickly this attitude changed to one of enthusiasm after the department began to operate with typical results. It might be safe to surmise that this situation has been duplicated elsewhere in the past and might be prophetic for others.

Is there anything to suggest the wisdom of further advances in physical therapy at this time?

1. It is reported that two-thirds of our hospitals in the United States have x-ray departments, whereas slightly more than one-third have departments of physical therapy. It is suspected also that the x-ray departments are better equipped and staffed on the whole than the departments of physical therapy. What does this indicate?

2. If it be true as stated that from one-fifth to one-fourth of the patients in general hospitals can benefit by physical therapy and three-fourths of the surgical, neurosurgical, and orthopedic cases require it, many must leave hospitals without such therapy.

3. Unless undergraduate medical students are given courses in physical medicine which challenge their enthusiasm and respect, how is the profession to learn its fundamental place in practice, its indications and contraindications, the role of the specialist in this field, the work of the Council on Physical Therapy, and many other pertinent considerations? All of us know that to leave this ground work to postgraduate education embodies difficulties never likely to be surmounted. High grade undergraduate education in physical medicine requires well equipped and staffed departments, better teaching even than for the older subjects in the curriculum, and a

* Read at the Twentieth Annual Session of the American Congress of Physical Therapy, Washington, D. C., September 4, 1941.

stimulating atmosphere made so by the proper respect and cooperation of the whole medical school staff; faint praise damns a lot of good things in some circles. Further, the undergraduate course should be the place for sowing the seed later to flower in recruitment of candidates for specialization in physical medicine. Where does the undergraduate stand, however, with respect to these several considerations when about one-third of the medical schools of the country offer no instruction in physical therapy whatever and many others do so under conditions impossible of maximal results.

4. The inadequacies of postgraduate and graduate education are not peculiar to physical medicine. Nevertheless, there is general agreement that the number of thoroughly prepared physical therapists is limited in relation to potential needs; that if many new departments were to be set up simultaneously, as might well happen, adequate staffs would be a sheer impossibility. There is even a shortage of technicians and only about a score of centers in the whole United States for their training.

5. Based on the experience of the first World War it is estimated, "that from thirty to forty per cent of our wounded in action would require physical therapy." How is this service, if required, to be provided under present conditions? It would seem that a grave national emergency might produce a crop of "half-baked" specialists and technicians to the serious handicap of physical medicine for a generation.

6. The life span is lengthening apace with about as many problems for medicine as for industry and other phases of life. Great sums have been spent in the study of infancy, childhood and youth; little or nothing, on senescence. We are just waking up to this staggering fact. What general biology, physics, anatomy, physiology, psychology and the rest can contribute to geriatrics remains to be written; the implications are myriad. Your familiarity with them does not require their development here. This question remains, however: Is physical medicine prepared to play its full part in developing geriatrics through education, high grade workers in plenty, basic and clinical research?

7. It is trite to point out that any service to the sick, such as physical medicine, which requires the application of a multiplicity of scientific principles, also requires elaborate, effective and never-ceasing research, both basic and clinical. Much good work of this sort can be pointed to, yet the opportunities and responsibilities here are almost limitless, requiring money, stimulating working conditions, scientists in variety, clinicians, consultants, and cooperation without end.

I have ventured to remind you of a few items; you will think of others, which may suggest that the task of physical medicine looms large at the moment, that this task carries even a note of urgency. To recapitulate—it has been pointed out, (1) that many hospitals are still without departments of physical therapy; (2) that many potential patients are still unserved for a variety of reasons; (3) that undergraduate medical students in numbers lack instruction; (4) that postgraduate and graduate education does not seem to be equal to the demands for specialists; (5) that national defense may make unprecedented calls upon physical medicine; (6) that geriatrics awaits the contribution which physical medicine can make; (7) that research calls for ever greater support and development in this field.

I have no doubt that progress in meeting these and other challenging objectives will be substantial. Generally in a situation like this some special attack is likely to be fruitful. One such proposal will be made with some boldness perhaps but with genuine conviction.

It is believed that a variety of circumstances including those mentioned now conspire to point to the need of establishing in some medical center with undergraduate medical students an institute of physical therapy of such proportions and quality as to make a convincing demonstration in this field, so adequate and challenging that its influence will be felt even abroad.

Such an institute should be a coordinated part of a medical center, adequate in plant to care for patients both rich and poor, to educate undergraduate medical students, specialists, the profession already in practice, and create ideal conditions for research which emphasizes the sciences basic to physical medicine and equally emphasizes physical medicine in relation to patients. The director should be an acknowledged leader, should be supported by an advisory committee of national repute, and should with his staff be given a free hand to develop an agency which would command the attention, respect, and, as far as possible, the cooperation of all those who believe in the efficacy of science and the demands of the social order in meeting its necessities through the highest endeavors of science. Such an undertaking would require large financial resources, it is agreed, but how such resources could be better applied than to the demands and possibilities of physical medicine would be difficult to imagine. The institution which can set up such a demonstration institute will no doubt be a Mecca for those who alike seek light and health.

SALVAGING THE LAME BACK PATIENT *

FRANK R. OBER, M.D.

BOSTON

There is a tremendous economic loss in industry due to that symptom usually designated as low back pain. This symptom is common in persons who are relatively young and vigorous and in whose spines there are no bony pathologic changes as revealed by the roentgenogram. One may wonder why so much disability is present, especially when as is so often the case, the spine shows marked bony changes without any symptoms whatever. It is in this group that all the mechanical possibilities must be evaluated and corrected if the patient is to be restored to his normal activities. Recurrences of backache, which usually become increasingly frequent and progressively worse as time goes on, are all too common. Snap diagnoses of "sacroiliac" and lumbosacral strain without adequate examination are to be deplored, since the treatment is apt to be as sketchy as the diagnosis.

It is not difficult to make a proper examination of patients with a lame back if one keeps in mind that there are regions outside the location of the pain which may have something to do with the presenting symptom. For example, limitation of straight leg raising is not always a result, since it is seen frequently in persons who have never had backache, being an inherent condition which has existed from childhood. Such persons usually have highly arched feet and short calf muscles and often other associated conditions of contracted structures, notably in the fascial envelopments of the thigh. Contractures of the posterior soft parts of the thigh are often seen after an attack

* Read at the Twentieth Annual Session of the American Congress of Physical Therapy, Washington, D. C., September 2, 1941.

of poliomyelitis in which there has been muscle tenderness. It may be noted also after any prolonged illness in children.

The point is that when these contractures are present there is an inhibitory action to some of the spinal movements. The patient who can bend over with his knees straight and touch the floor with his hands is less likely to hurt his back than the one who is restricted by shortness of the posterior soft parts of the legs. The spinal motions in the two persons may be the same, especially when tried in the sitting position with the legs and thighs flexed. A person who has this physical combination of high arches and contractures is usually fast on his feet and loves tennis and dancing but dislikes long standing in one position because he tires quickly and his legs and back are apt to be uncomfortable.

From the foregoing one may gather that there are mechanical conditions outside the spine which may affect the spine itself. When these conditions are superimposed on some abnormal condition in the vertebral column they must play some part in producing pain, especially in the low back region, which appears to be the most vulnerable area.

One must consider a situation opposite to that of contracted strong muscles and fascia; that is, the situation of the patient who leads a sedentary life or who has had some debilitating condition. Such a patient's muscles are often so below normal in tone or so relaxed that the normal physiologic curves are distorted and the result is irritation of other supporting structures of the vertebral column, with chronic backache. A good example is seen in the woman who has been through frequent pregnancies which have left her with a poor set of abdominal muscles. This abdominal weakness allows the pelvis to rotate downward, thus increasing the lumbar lordosis. Loss of muscle tone occurs also after repeated attacks of backache and is probably a good reason why each attack is very apt to be worse than former ones.

It may be assumed that any disease, trauma or mechanical condition distorting the normal physiologic curves of the spine and affecting the normal posture produces pain primarily because of the postural change.

The most common complication in low back disabilities is pain along the sciatic nerve. This pain varies in intensity and duration and in the part of the nerve affected, and it is influenced for good or bad by the attitudes and positions of the patient. Some patients are more affected by sitting, some by standing and some by lying, and some are affected by all three. In every case straight leg raising is more restricted than is usual, and the test of straight leg raising nearly always increases the pain. Some patients have difficulty in extending the leg while sitting. They all find their most comfortable positions when they are in bed. It must not be presumed that sciatica is due to a lame back, as a number of patients have free motion of the spine in all directions and can reverse the lumbar lordosis in forward bending. The one restriction in forward bending is that they are unable to reach with their hands to the floor. This restriction may be due to sciatic pain or to shortened posterior muscles. In other words, if the back in which motion is free is concerned the lameness must be due to abnormal posture or to some factor outside the lumbar and sacral regions. Such a factor may be a flat back, an increased lumbar lordosis or a tilted pelvis. In all cases of sciatic pain involvement of the nerve itself by inflammation or by new growth must be considered in arriving at a diagnosis.

Treatment

There are many factors to be considered in treating the patient, among which are his occupation, the severity of the symptoms, his condition and

the complicating sciatica when present. The best place for the patient with severe involvement is in bed. The bed must be flat and firm, since a sagging bed distorts the spine and increases muscle spasm. Rest in a proper position will decrease the spasm and relieve the pain in a great many instances. In addition to rest, a low back support is usually indicated. Adhesive strappings, abdominal swathes, snug-fitting girdles, plaster strappings and plaster corsets are all useful. When there is pain in the sciatic nerve the patient is more comfortable with the affected thigh held in abduction and the knee flexed on a comfortable pillow. It may occasionally be necessary to use traction, and sometimes immobilization in a plaster spica is indicated. Nearly all the patients require a sedative, especially during the period of severe pain. The kind of sedative varies. Morphine or codeine and a salicylate are usually efficacious. The sedative has a two-fold action; it relieves pain and it keeps the patient quiet. Keeping the patient quiet is important, since immobilization will help to relieve muscle spasm, which in turn lessens the pain. Most patients learn how to make themselves comfortable in bed, whereas helpful attendants may bring on an acute attack of pain. When the patient can roll around in bed and requires little or no sedative, he should have a corset made which supports the low back, pelvis and lumbar spine. The best corset is one made to fit the patient. For a woman one can use a good corset which fits moderately well as far as shape and size are concerned, but it must be altered so that it fits as accurately as a corset can be made to fit. The requirements for a proper corset were laid down by Reynolds and Lovett[1] in 1910 and still hold good:

1. The corset must support the abdomen.
2. It must follow the contour of the back from just below the inferior angles of the scapulas.
3. The crests of the ilia must have room under the corset.

If a corset is comfortable the patient's condition should improve, and as his condition improves his posture tends more to the normal. Therefore, one must be prepared to readjust the corset so that it will continue to fit the patient as he improves. Any corset which is designed to be laced in such a manner as to pull a hollow back backward to a corset which has flat steels in the back will not relieve muscle spasm. On the contrary, the spasm will increase. Such a corset is no good because it does not support properly. In rare instances extra support may be required, and if so the addition of a Taylor back brace will be helpful. During the period of acute pain heat is beneficial either from hot fomentations or from electric light. When heat is applied the patient must be in a comfortable position. It is to be remembered, however, that cooking for hours is not good treatment, as it never cures lame joints.

The patient who stoops over to open a bureau drawer or who sneezes in bed and has a sudden attack of agonizing pain is a difficult problem which has not yet been solved. An attack of this sort is usually relieved within a few days by rest. It may, however, be the predecessor of the chronic recurrent type of backache that is precipitated by frequent episodes of this sort or by any of the other mechanical disturbances mentioned. If there is persistent sciatica one must consider the possibility of a ruptured nucleus pulposus. A lumbar puncture should be done, and if the total protein content and the cell count are increased or there is evidence of a block, then an injection of iodized poppyseed oil is indicated. This should be done under the best conditions; that is, the neurologic, orthopedic and radiologic set-up must function in the highest degree of efficiency. If a ruptured nucleus is demonstrated, it may respond to conservative therapy; if it does not, the "tumor"

should be removed. In some instances an operation for removal of a ruptured nucleus has been performed and no tumor found. In some of these cases the diagnosis of a thickened ligamentum subflavum is made. A ruptured ligamentum subflavum may produce bilateral sciatic pain. A thickened ligament may or may not do so. Thickening of the ligament may be due to chronic lumbar lordosis. Unless this diagnosis can be established satisfactorily, conservative therapy should be the rule. Recent additions to the knowledge of lame backs has tended to narrow some viewpoints instead of widening them. All lame back conditions should not be called ruptured disk or what have you. The use of the term sacroiliac as a diagnosis of all low back lesions has been in common and unjustifiable use for too many years; so with added information the approach to this problem should be broadened, not narrowed.

There are patients who have lame back without sciatic pain, there are those who have the condition with sciatic pain, and there are those who have chronic or recurrent sciatic pain without the lame back but who have attacks of backache. Patients of all three types may have a positive Ely sign, positive abduction signs and limitation of straight leg raising. When the condition persists, the roentgen observations are negative and there is failure to respond to faithful, well planned, conservative orthopedic and physical therapeutic measures, a bilateral fasciotomy is indicated. In the general care of the lame back patient, it will be found that most of the patients will respond to conservative measures, which include rest, protection and advice about avoiding the motions which increase or produce pain. However, one must not be satisfied to relieve the patient's condition and send him off about his business, because sooner or later he will have a subsequent attack. No one should treat such a patient unless he is prepared to restore the musculature and posture to normal. After all, such persons have not always been in difficulties. So, is it not possible to suppose that their difficulties may be overcome by proper measures of physical therapy? Is it not the duty of the physician to see to it that these patients receive the benefit of a reconstructive method which is known to be useful? I refer to a well planned, careful method consisting in the use of rest, heat, massage and exercise under proper supervision by trained physical therapeutists. This in itself will solve a large part of the lame back problem.

It should be an axiom to apply no treatment which causes pain. To do so only aggravates what is already present. It must be the aim to relieve pain, restore the circulation, combat muscle spasm, restore to normal the muscles which support the back, remove deforming factors and stretch contracted structures or, if they cannot be stretched, use surgical means. In a word, endeavor to reproduce the anatomy, physiology and posture which belonged to the patient before the start of his back trouble. In most instances this is possible, and we are the ones to convince the doubters that it can be done.

234 Marlborough Street.

Reference

1. Reynolds, E., and Lovett, R. W.: An Experimental Study of Certain Phases of Chronic Backache, J. A. M. A. **54**:1033 (March 26) 1910.

THE CORRELATION OF PHYSICAL THERAPY AND OCCUPATIONAL THERAPY IN CEREBRAL PALSY *

WINTHROP MORGAN PHELPS, M.D.

BALTIMORE

There have been no definite criteria for the accurate treatment of cerebral palsy. The indications and contraindications for treatment have been discovered mainly as a result of surveys which have been made in several different states. These surveys were made not only of untreated cases, but also of many cases which had been extensively treated. The results of the treatment indicated which methods were successful and which had failed.

Physical therapy, occupational therapy and surgical intervention were included. It was necessary to determine many factors such as the length of time for each treatment, the number to be administered over a given period, efficiency of the technician, and the cooperation of the family. In addition the type of cerebral palsy, degree of severity, degree of involvement, and the mental age of the child were considered. In many instances much of this material had to be approximated, because in such surveys details were seldom available. Many of the children who had had no treatment showed improvement, which indicated that spontaneous improvement including growth and development might be expected. Evidence of improvement to be of value must be in excess of natural improvement. For example, there were few children in the untreated groups who had not walked by the time they were eight years old; on the other hand, those in this group who had not walked before this age, never walked. Following treatment, a majority walked before they were six years of age. There were several children between the ages of fourteen and sixteen who were taught to walk after treatment had been started.

The psychologic makeup of children handicapped by cerebral palsy since birth is interesting. If there is some definite activity such as walking or speaking which had never been developed, they do not miss it but adapt themselves to getting along without it. Parents often say that their child wants to walk more than he wants to do anything else, but careful study of the child will show that the parents have taught him to say and to believe this. The child has no strong feelings in the matter, because something one has never done is not greatly missed. We are aware that birds fly and we know that would be a convenience, yet it cannot be said that we are in a constant state of unhappiness because we cannot fly. It is not possible to evaluate the true urge of the child who is handicapped to do something he has never done by our feelings. Often statements of the parents as to what a child wants to do are merely reflexions of what the parents want the child to do.

Treatment Methods

Measures used for the improvement of cerebral palsy include most of the modalities used for the treatment of other muscular conditions. There are, however, certain exceptions. The nature of involvement of the muscles in either spasticity or athetosis is not fundamentally weakness, such as in poliomyelitis, but is usually too much strength used wrongly. The fundamental principle of the use of the therapeutic pool is to eliminate resistance due to gravity so that weak muscles may be carefully built into

* Read at the Joint Meeting of the Twentieth Annual Session of the American Congress of Physical Therapy, and the Twenty-Fifth Annual Session of the American Occupational Therapy Association, Washington, D. C., September 3, 1941.

stronger ones. In cerebral palsy this principle is occasionally, but not often, found. It is necessary to learn control of the arms or legs in a gravitational field. For athetosis in particular it can be seen on examination that the action of the muscles involved in the athetoid motion are different in the prone position than they are in the supine position. The athetoid motion will change again in the sitting or standing position. It is necessary to teach control in the various positions and under the gravitational influences in which the body is to be used. An athetoid child can be taught to walk in the water, but he will be unable to walk on land because gravity will so change the necessary muscular pulls that it will represent for the child another and quite different technic.

If the arm is held above the head, and the elbow slowly flexed and extended, it is obvious that both extension and flexion are functions of the triceps because the arm is extended by the triceps which then acts as a brake on too rapid flexion, due to gravity. If the same motion, elbow flexion and extension, is performed with the arm at the side, the motion becomes a function of the biceps in each direction for the same reason.

Athetosis is a disturbance of the ability to flex and to extend the joint and not a condition involving (as in poliomyelitis) the biceps or triceps muscle. Therefore, the abnormal athetoid movements will vary with the position of the arm and gravitational influences. It is possible to teach an athetoid to perform a smooth elbow flexion-extension motion in a recumbent position, whereas in the sitting position this motion will be as badly performed as ever. Useful motions of the part involved must be taught in the normal positions of use and under normal gravitational influences.

The Combination of Physical Therapy and Occupational Therapy

This brings out the importance of combining measures of physical therapy with occupational therapy. The treatment of cerebral palsy consists of the training of a different part of the brain to take over the function of the damaged areas. In this respect it parallels the teaching of a skill not normally or automatically acquired by the person. Walking is usually automatically learned by the normal child, but if the mechanisms involved in walking are not functioning, then walking must be learned as a skill. In this, the teaching would closely parallel the teaching of the fingers to "walk" on the keys of a piano or a typewriter. Playing the piano is a highly complicated series of motions which, after enough practice, become automatic and are done unconsciously. It is necessary for technicians in cerebral palsy to be acquainted with results of teaching methods in the skill fields, and to apply these principles to the cerebral palsy teaching. Walking, to the child with cerebral palsy, is the equivalent of piano playing, for example, to the normal child.

It is in the province of physical therapy to teach fundamental motions. Training in physical therapy is pointed toward ability to obtain normal balance between flexors and extensors, accuracy of joint movement, relaxation during use, and balance function. Emphasis is also placed on anatomic relations, kinesiology, physiology of muscles, body mechanics, economy of use, and restoration of normal automatic functions.

In the training of occupational therapy aides, the emphasis is quite different. The basic knowledge of anatomy and kinesiology is stressed, but beyond that, the emphasis is shifted to training in the skills and total activities which can be utilized to bring about restoration of function. The training of the occupational therapist also includes valuable training in psychology, behavior, and psychiatry.

Athetosis

In an ideal situation when both physical therapy and occupational therapy are available, the patients who have cerebral palsy would begin their

treatment under physical therapy direction. The nature and grouping of the modalities of physical therapy would be dependent upon the case. The athetoid patient would begin with progressive relaxation, first in the prone, supine, or side-lying position, and would change to the sitting or standing position as soon as the previous position was learned. Simple motions, first of the large joints, would then be taught in the relaxed position. These would be gradually extended to the small joints when relaxation could be maintained. Later, combined motions, such as elbows and fingers, would be taught.

When this could be accomplished, in a useful position such as sitting, the further training would be by the use of occupational therapy. Occupational therapy, previous to this stage, is not technically possible, because there are no useful activities which can be performed by the use of a single joint motion. Physical therapy would not be stopped at once but would be gradually discontinued as the occupational therapy skill became greater. Eventually the training of the arm would be entirely a project in occupational therapy.

The training of the athetoid in walking would be a more continuous procedure in physical therapy. In walking, maintenance of posture, balance and correlation of function involve so many of the fundamentals of physical therapy that there is comparatively little of a strictly occupational therapy nature connected with it. Other activities of the leg such as the use of pedals on a wheel or the treadle, which may help in muscular balance, may be carried out in the occupational therapy department but actual walking can be learned only by practice in walking and this should be done in the department of physical therapy.

Spasticity

In the spastic patient conditions are very different. Here the condition is susceptible to charting of the muscles as it does not change with position as in athetosis. Certain muscles are spastic, others weak, and others are flaccid. Among these muscles are scattered normal muscles, both in function and strength. From such a chart, the treatment is carried out. It is the province of physical therapy to bring about normal balance and function as nearly as possible by the use of active, passive and resistive motion; massage of weak or flaccid muscles; rest from use of spastic muscles and general balance and postural corrective measures to facilitate use. Surgical operations on muscles and tendons are not advisable for athetoid patients because, changes of position alter the muscular involvement. For the spastic patient surgical intervention has a definite value. It is not curative but it is incidental to the use of physical therapy. The retraining following surgical intervention is also an important part of the use of physical therapy for spastics. Occupational therapy for spastics can begin earlier than for athetoids. Relaxation, while of some importance, is not the great fundamental principle that it is in athetosis. For spastic conditions the greatest necessity is good reciprocation between flexors and extensors. In many spastics the trouble is not lack of reciprocation but lack of speed of reciprocation. Thus in walking they cannot pull the foot into dorsiflexion quickly enough for clearance on the next step. Much, but not all, toe walking is due to this. It can be seen that treadle work, in which the resistance to dorsiflexors is greater than to plantar flexors, would be a procedure in occupational therapy which would greatly enhance the walking, if this work could be aimed at the attainment of greater and greater speed of reciprocation between dorsiflexion and plantar flexion of the foot. Later it would be necessary to work with the two feet at once, in opposite directions, because walking is dependent not only on quick reciprocation between dorsiflexion and plantar flexion of one foot, but of both feet in opposite directions.

In the arms of the spastic also free reciprocation at a sufficiently fast speed between antagonistic groups is the aim. For single joints, this is best carried out by the use of physical therapy but when combined motions are used, it is a problem for occupational therapy. Here again, the use of the two arms reciprocally, or in opposite directions, is important because the two arms are not very useful if one hand copies the motions of the other as so often happens in spastic paralysis.

Ataxia

In the third group of patients who have cerebral palsy, the ataxics, the problem is almost entirely one of training in balance. By balance is not only meant balance of the trunk, but also balance between gravity and the amount of muscular power to be used. The ataxic patient has, by the nature of his difficulty lost this sense and he must be trained through conscious effort which eventually becomes habitual. In severe cases, the eyes must be used as an aid, because postural or positional sense may be entirely lost. The ataxic patients do not have any localized muscular difficulty, unless it is due to use of an extremity in a wrong position over a long period, when deformities or contractures may develop. The difficulties are due to an inability to make a quick adjustment to a position which is off balance and to a lack of appreciation of the help or hindrance of gravity in the use of an arm or leg in a given position. Physical therapy is obviously first for training in quick balance correction, before the body is too far off balance to prevent falling. In severe cases this would be begun with correction of head balance in the supported sitting position, followed by training in sitting trunk balance, then in the knee standing position and finally standing. This would be done first with the eyes as a help and eventually blindfolded if possible. Occupational therapy would be given to train the patient in the coordination of eyes and hand, in all types of activities and eventually while blindfolded if possible.

It is to be remembered that the description given for all these groups are merely suggestive. For example, many athetoid and spastic patients require training in balance because of lack of experience in balance and relaxation may be necessary in spastic and ataxic as well as the athetoid person if through fear or habit tension has developed. There would be many variations of the application of physical therapy and occupational therapy which would suggest themselves in each individual instance.

Aims of Treatment

The eventual aim in the treatment of cerebral palsy is to make the patient able to carry out and accomplish all the activities of the normal person. Eating, writing, speaking, walking, dressing, including buttoning, and lacing the shoes, must be done and fast enough if he is to live normally. All of these activities are occupations. It is the function of the department of physical therapy to prepare these children for the training they are to receive in the department of occupational therapy. Each of these two classes of technicians has different fundamental training and each can bring to bear a different point of view on the problem. Many normal acts such as eating, are performed by the cerebral palsy patient in an awkward way and this must be modified to a more normal way by the use of occupational therapy. Often modification of these acts is not possible, however, without the intervention of the physical therapeutist whose training makes possible better individual and combined function so that the occupational therapeutist can proceed with the retraining.

The relation between the two fields is close, but the training in each field must be taken into consideration in the determination of the part of the treatment to be undertaken in each individual case.

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PHYSICAL THERAPY IN WARTIME BRITAIN

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Even before the present war British physical therapy physicians looked on the work of their American colleagues with admiration and, I might say, with a touch of envy, at the recognition they won amongst their medical brethren, the efficiency of their apparatus and the progress they were continually making both in technic and in improving apparatus. Conditions are not as good in Britain; in only a few of the teaching hospitals is a physician trained in physical therapy appointed to the staff. In general this branch of medical science was torn into three parts; the orthopedic surgeons claimed massage and remedial exercises, the radiologists considered electrotherapy as their sideline, while the dermatologists controlled the use of therapeutic lights. During the last two or three years a physician has been tolerated in the department of physical therapy in one or two of the leading London hospitals, but these departments still occupy only a subsidiary position. The war came and with it a wonderful opportunity; high hopes were entertained that the physician interested in physical therapy would come into his own and be allowed to relieve the orthopedic surgeon, the radiologist and the dermatologist of their side lines so that they could devote all their energies to their particular specialty, while physical medicine would be left in the hands of those who had specialized in it.

At this juncture there was introduced a decree, under the Defense of the Realm Act, prohibiting the use or possession of any high frequency apparatus having an output of ten watts or more. Hospitals and approved voluntary institutions were exempted, provided that all apparatus was effectively screened and suppressor units installed. Possibly Great Britain was the only country where a similar regulation had not been in force for many years. It is clearly necessary to take steps to avoid, as far as possible, interference with radio transmission in peacetime as well as in war; nevertheless, the introduction of this measure at this moment greatly handicapped the employment of one of the most useful and modern advances in physical therapy. Neither material nor the skilled workers could be released to any extent from vital war work to make these units. Thus the use of diathermy and short wave diathermy was greatly restricted and any expansion was quite out of the question.

When war became imminent an excellent emergency hospital was put into operation in anticipation of an enormous number of casualties due to air raids among the civil population, as well as in the services. Almost over night patients in the London hospitals and those in the big cities were evacuated to scores of small hospitals in the country, which had been prepared. This in itself was an amazing performance of organization. But the powers that be decreed that the only physical therapy equipment required at these hospitals was the portable faradic coil, the galvanic battery and the radiant heat lamp. Following some agitation this was amended to allow, in special instances, a small ultraviolet generator to be supplied. Diathermy and short wave diathermy apparatus, of course, were excluded, for the reasons already referred to.

That is one side of the picture of the position of wartime physical therapy in Britain. Let us consider some of the work being done in spite of these defficulties. As I have said, private practice has largely disappeared. In London many hospitals have suffered from enemy action; the British Red Cross Clinic had to close as did the Institute of Physical Medicine. Only the Institute of Ray Therapy carried on without closing its doors for a single day. In many of the damaged hospitals the departments of physical therapy were either closed or their activity considerably curtailed.

Conditions Resulting From the War

Of the conditions which have made their appearance as the direct result of the war and for treatment of which physical therapy is of real importance, only the few outstanding ones will be discussed. I will mention first the "shelter shoulder" as it came to be known. In the early days of the "blitz," when Londoners were subjected to twelve and fourteen hours of heavy bombardment night after night, sleeping arrangements in shelters had to be improvised. Large numbers slept on the hard stone platforms of the underground railways and in surface shelters with little or no bedding. Others adopted the deck chair, and it was the latter which was largely responsible for producing the "shelter shoulder." Perhaps it would be as well to explain what is meant by this colloquialism. Patients went to sleep easily, slept the deep sleep of exhaustion and awoke with one arm paralyzed, usually the right. They presented the typical signs of a musculospiral paralysis, including the drop wrist. The writer was, he believes, one of the first to call attention to this condition, and to offer an explanation for it. A person sleeping in a deck chair would turn to the side, usually the right, and the square wooden frame of the chair would cause pressure on the nerve, resulting in the paralysis. No doubt coldness and dampness played some part in production of this because pain in the shoulder joint and the muscles associated with this condition. In other cases, sleepers would hang one arm over the back or side of a chair and thus produce the typical "crutch palsy." Of the twenty-four patients seen by the author all but a few recovered in a period of time from fourteen days to a month; that one or two did not recover was attributable to additional bomb shock. The treatment given was infra-red irradiation for twenty minutes followed by the application of a surging galvanic current sufficient to produce gentle contraction of the muscles, the labile method being used. The arm was kept in a sling until there were signs of recovery and then the patient was encouraged to use the arm to do graduated exercises. At this stage the use of galvanism was discontinued but the infra-red irradiation continued.

The next condition to be considered is the carbuncle and multiple abscesses. Much has been written about the treatment of these conditions by means of short wave diathermy, but it must be remembered that in Britain, the idea of treating carbuncles by means of physical therapy is revolutionary. Hot fomentations first and complete excision later is still the orthodox method of treatment. A carbuncle was a rare sight even in the out-patient department of a busy hospital during peacetime. It was not until two and sometimes three carbuncles a day were being seen that it was realized that this was unusual. Moreover, the patients invariably were in the Civil Defense service and almost without exception engaged in demolition work. It is a matter of opinion that the germ-laden dust, pentup for years and suddenly liberated, was in some way directly or indirectly a contributary factor to this sudden appearance of carbuncles in such quantity. The technic adopted was to administer daily treatments by means of short wave

diathermy; in severe cases treatment for twenty minutes was given night and morning, in less severe cases, thirty minutes was given once a day. As soon as pus formation had ceased, which was found to vary from five to ten days, ultraviolet irradiation was given daily in sufficient dosage which, on normal skin would produce a second degree erythema. To make the treatment complete and to obtain the quickest results, full body exposure to ultraviolet radiation administered daily was added, giving minimal erythemal or suberythemal doses. In the treatment of thirty patients with carbuncles it was observed that the average time taken to clear up the lesion was from ten to fourteen days. The longest time taken was three weeks.

Another condition worth mentioning was the effect of shattered glass from bomb explosions. The damage was far greater than would be anticipated. The mass of small lacerations, which occur chiefly on the face and hands, made the application of dressings difficult; this was especially true when the injuries occurred in children and babies. The face and arms of one baby eighteen months of age, injured in a daylight raid, looked as if they had been sprayed with pellets from a shotgun. If these patients were treated immediately with ultraviolet irradiation, before any greasy dressings were put on, in two or three days every laceration was dried and the best of all dressings was formed, i. e., a natural scab under which healthy granulation quickly forms, leaving the minimal amount of scarring. Of course, skin grafting had to be done, in bad cases, where the cuts were profuse and deep. The technic of administering ultraviolet irradiation was to give a mild erythemal dose. It must be remembered that the inflammatory reaction around each cut allows some latitude in dosage.

Two other conditions will be referred to briefly. The first results from having slept in damp shelters with insufficient protection against damp and cold weather. This, as would be expected, gave rise to those conditions so often labeled rheumatic fibrositis and characterized by stiffness and pain in the limbs and back. These patients were treated by means of infra-red irradiation administered for twenty minutes, followed by movements and, for some patients, massage as well.

Another condition is mild bomb shock. Not the severe type which produces cerebral disturbances with definite physical signs, but the milder type characterized by subnormal temperatures, coldness of the extremities and an anxiety state which was due to being exposed to a blast or from being buried in debris for several hours. Hot aerated brine baths given immediately and followed by massage were effective in the treatment of this condition. When the initial stage was over, general ultraviolet irradiation should be continued for at least a month.

A large proportion of the population is feeling the effects of working under black-out conditions and being deprived of the normal amount of sunlight by having to work on night shifts. This is a matter which the industries are handling independently by the installation of small solaria. The author has just completed the arrangements for the installation of elaborate apparatus in a mine in order to make it possible for three hundred miners to be treated every half hour. A similar arrangement has been made in a factory which has its own bomb shelter, where four hundred of its workers sleep every night. The effect of small prophylactic or tonic doses of ultraviolet radiation given daily to people who work aids in counteracting the effects of the long, trying winter. It is to the credit of all these firms that they are bearing the expense of this themselves, and often in spite of official discouragement.

In concluding this article a word must be said about the staff and patients of hospitals. The staffs have stood up magnificently to the continued strain of night and day bombing; for weeks many have made long nightly journeys through heavy gunfire.

'I wonder if I can convey a sound picture of what is happening in a physical therapy department in the heart of London. There is the crackle of the spark-gap diathermy machines, the mellow hum of the short wave generators, the fuzzy buzz of the faradic coils, the spluttering of the carbon arc lamps, and the slapping sound of massage; then above all these normal sounds the wail of the siren, followed by the bark of the guns, the scream of a bomb followed by a thud and vibration of the whole building, but the familiar sounds of the department still go on with a background of gunfire. But why are the patients not rushed to the well prepared shelter as soon as the warning goes? They were at first but now they say, "We have come here to have our treatment and Jerry isn't going to put us off." So the women and children as well as the men come for their treatment irrespective of warnings or raids. Nevertheless, when things get really dangerous, the arrangements for evacuating the patients to the safety of the shelters are carried out smoothly.

And here is an example of the patients' thoughts. One old lady asked me anxiously if the treatment she was having was that "healing ray that guides the bomber." She was having short wave therapy for rheumatoid arthritis and I told her it was the treatment which had been so-called by the newspaper man's imagination. "Then," she said, "I'll stick to the pain of my rheumatics rather than help to guide those devils." No explanation concerning screening and suppressor units would shake her.

So physical therapy goes on doing its bit for the ordinary man and woman in London and the cities of England, under great difficulties, but the prospect for the near future looks brighter. Great and far reaching plans are afoot which will change the whole scope and outlook for physical therapy. The government is determined that those disabled, whether in the fighting services, the home defenses or industry, shall not be human derelicts, that these men and women shall not be condemned to a lifetime of drudgery or charity through some disability. A comprehensive plan extending the realms of physical therapy to embrace rehabilitation has been decided on. Centers are to be established throughout the country where treatment will not end with the best that surgical intervention can give. The treatment will continue through the use of the department of physical therapy, educational games and finally the educational workshop. So the men and women injured in the defense of their country, whether as the result of enemy action or industrial accident, will be trained as skilled or semi-skilled workers, opening up to them a future of useful wage earning potentiality. Thus the picture of physical therapy in wartime Britain will be completed.

THE APPLICATION OF CLIMATOTHERAPY IN GENERAL MEDICINE *

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A careful appraisal of available statistics has shown that 35 to 40 million Americans participate in annual seasonal, vacational migrations. A large percentage of these migrants, perhaps 8 to 10 million, are chronically ill. They include underdeveloped, anemic children; middle-aged persons with varying types of chronic ailments, such as arthritis, tuberculosis, nephritis and other inflammatory processes, and many persons of advanced age who evidence in the organs of digestion, blood circulation and locomotion the effects of time, occupation and faulty habits. These travelers are guided mainly by whim, vogue and size of purse. Their direction, supervision and treatment create a promising research field and an inspiring duty for the general practitioner of the future.

Every vacational migrant meets a climatic change, which if scientifically controlled could be utilized in the treatment or prevention of disease. By climate I mean the sum total of meteorologic phenomena that characterize the average state of atmosphere at any given locality. "Weather" is only a phase, a single act of this succession of phenomena. Climate is a long range view on weather. The sum total of climatic changes includes differences in air temperature, humidity, velocity and direction of prevailing winds, duration of sunshine, amount of rain, quality of soil and of vegetation and electrical phenomena of the atmosphere. Geographically, one distinguishes the arctic, temperate and tropical climates. Medical science is also interested in the geologic background of the climates, and according to that background one distinguishes seashore, desert and altitude climates. The most important climatic factor is the heat-absorbing power of the atmosphere, which is a resultant of temperature, humidity and wind velocity. If this heat-absorbing power of the new environment is higher than that of the original habitat, the change in climate will have a stimulating effect on the system; if this power is less, the change will have a sedative effect.

The Relativity of the Effect of Climate

The sedative climate is characterized by stability of weather, by insignificant fluctuations of temperature, barometric pressure and humidity and by the lack of winds and storms. The stimulating climate is characterized by sudden and wide atmospheric fluctuations. While one considers the Northern climates generally as stimulating and the Southern climates as sedative, one must consider the element of relativity. This can be illustrated with three types of persons: (1) the New England fisherman, (2) the New York business man, and (3) the Florida farmer, each one of these being healthy in his own environment. The December climate of North Carolina will be stimulating to the Florida farmer and sedative to the New York business man. The New York business man will find the fall climate of Maine stimulating, while the New England fisherman, accustomed to drenching waves and strong winds, will find it mild.

Human Comfort

A person feels comfortable when his heat production is in equilibrium with the heat-absorbing power of the environment. Every person has

* Read at the Southeastern Sectional Meeting of the American Congress of Physical Therapy, Chattanooga, Tennessee, May 27, 1941.

a characteristic comfort zone, ranging within individual limits of temperature and humidity. Adapted to his environment by exposure, clothing and activity, a healthy man feels comfortable along extremely differing lines of effective temperature and becomes easily adapted to weather and climatic changes.

When the limits of the comfort zone have been exceeded chilling or perspiration results. The limits of the individual comfort zone depend on,

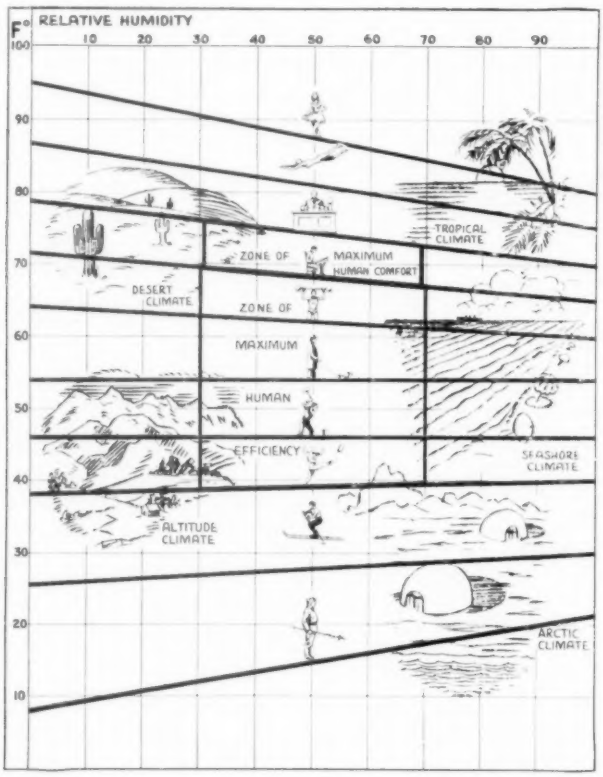

Fig. 1. — The climate types are symbolized in their respective location on this climatic map. The heavy lines connect points of equal comfort (equivalent of effective temperature). The human figures depicted are adapted to their individual climate by their way of living, i. e., amount of exposure, clothing and activity. They all feel comfortable during reasonable exposure to their respective climates. *A. de C.* Relative humidity is indicated in percentage of saturation.

and fluctuate with, seasons, time spent indoors and outdoors, clothing, activity, age, sex and constitution. Outside of its comfort zone the human system is confronted with various problems. If the heat-absorbing power of the environment diminishes (warm climate) heat loss is accomplished by vasodilatation in the skin and perspiration; heat production is diminished by lowering of the muscular tone and lowering of the basal metabolic rate. In a cold environment (increased heat-absorbing power) heat preservation is the problem. This is performed by constriction of the cutaneous blood vessels, an increase in the muscular tone and an increase in the basal metabolic rate. During the gradual change from fall to winter the heat-absorbing power of the atmosphere increases in parallel. The exposure to this gradual change extends the lower limits of the comfort zone, so that indoors one is comfortable at a temperature 5 or 6 degrees (F.) lower than that in the same room in summer. A corresponding elevation of the upper limit of the comfort zone occurs during the gradual change from spring to summer.

The migration to a more stimulating climate may be called "the Challenge." The migration to a less stimulating one may be called "the Escape."

Climatic Stimulation

The exposure to a stimulating climate starts a slight disturbance in the human system. Marked and typical fluctuations in the blood cell count and blood chemistry can be observed, and parallel changes in the basal and mineral metabolism occur. The organism immediately attempts to correct these changes by mobilization of its interrelated forces of defense — neuro-

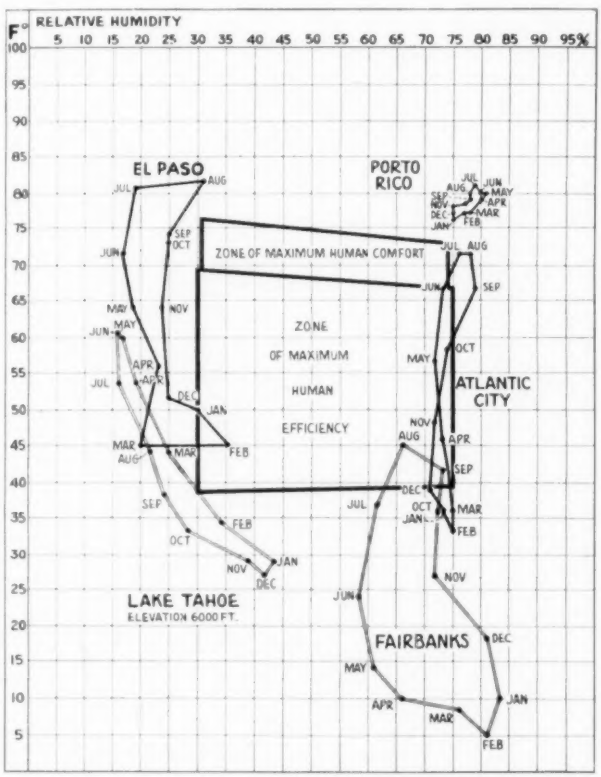

Fig. 2. — Comparative climatogram. The climatogram which covers all possible combinations of temperature in degrees Fahrenheit and relative humidity (per cent saturation), has projected on it the zone of maximum human comfort and the zone of maximum human efficiency. Silhouetted against these zones are the monthly temperature and humidity averages of different localities representative of different climatic types. Characteristics of climate types represented are: Puerto Rico, tropical; negligible fluctuation of a high temperature level, high humidity, lack of winds; enervating debilitating climate. Fairbanks, Alaska, arctic; moderate fluctuation of an extremely low temperature level, high humidity; exhausting climate. Lake Tahoe, Nevada, high altitude; extreme diurnal and seasonal range of temperature, low humidity, low barometric pressure, low oxygen content, high ultraviolet quality in solar radiation; stimulating climate. El Paso, Texas, desert; extensive diurnal and moderate seasonal range of temperature, extremely low humidity, abundant sunshine; moderately stimulating climate. Atlantic City, seashore; moderate diurnal, marked seasonal changes in temperature, high relative humidity, vigorous sea breezes; stimulating climate.

vascular, chemical and endocrine. During successive exposures the amplitude of these systemic changes decreases. The acclimatization progresses. On completed acclimatization, changes in the basal metabolic rate ranging up to plus or minus 15 per cent are repeatedly observed, paralleling changes in the heat-absorbing power of the atmosphere. Hemopoietic re-

actions to a stimulating climate producing an increase of 17 per cent in the hemoglobin count and an increase of 600,000 in the erythrocyte count are frequently noted. Fluctuations observed in the calcium-phosphorus and sodium-potassium ratios of the blood serum and in the blood content of sugar, creatinine and cholesterol follow definite patterns on climatic exposure (Haberlin, Petersen, Mills, Singer). Parallel with this process of acclimatization, preexisting chronic disorders of a functional, inflammatory or degenerative nature may be improved or overcome with the same systemic effort.

The chief indications for climatic sedation are: (1) constitutional weakness in (*a*) the feeble, aged person and (*b*) the delicate child; (2) debilitating diseases, such as (*a*) degenerative heart disease, (*b*) rheumatoid arthritis, (*c*) rheumatic heart disease, and (*d*) chronic inflammations of the kidney. If sufferers from these diseases are afflicted in addition with neurovascular instability, the escape will become a first degree necessity. One might consider a winter climate of a given locality to be sedative if its mean monthly temperature is above 55 F. Florida and southern California fulfill this requirement. A winter sojourn in other states is more or less stimulating. Stimulating summer climates are found in altitudes above five thousand feet and along some Northern seas and lake shores.

Rationale of Climatotherapy

The three main forms of climatotherapy are (1) simple change in climate, (2) selective utilization of climatic factors (sunning, bathing, open-air exposure) and (3) use of climatic change as a background for medical, surgical and physical therapy. The last is carried out preferably in a spa or health resort where there are available highly specialized types of hydrotherapy such as mud treatments for arthritis, carbon dioxide baths for cardiovascular diseases and inhalation therapy for chronic bronchial conditions.

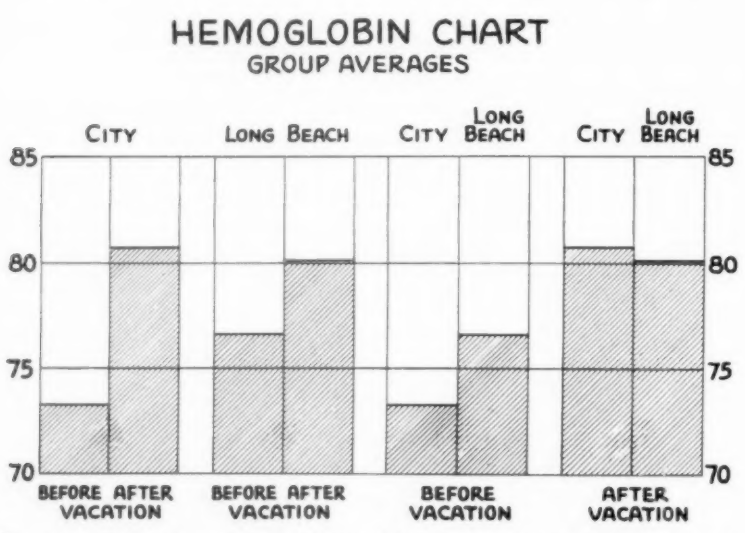

Fig. 3. — Changes in nutritional indices and hemoglobin values of children observed in medically supervised recreation in seashore climate, Long Beach, L. I.

The chief requisite of successful climate therapy is to find the optimal amount of climatic stimulation. There is an ineffective underexposure to climate and a harmful overexposure. The optimal amount of exposure, the therapeutic dose, varies with (1) the season and climate selected, (2) the

condition, constitution and age of the patient, and (3) the nature, and stage of chronic disorder to be influenced.

The pitfalls of undirected vacational migrations may be grouped as (1) qualitative, i. e., (*a*) faulty selection of the place of vacation, (*b*) disregard for climatic contraindications and (*c*) continuation of faulty habits, in eating, dressing and sleeping; (2) quantitative, i. e., (*a*) too short a vacation, (*b*) insufficient utilization of climatic factors, (*c*) overexposure to the climate, with consequent reactions, and (*d*) excessive activity during the vacation. These mistakes are due mainly to the fact that the migrations are ungoverned, are undirected from start to finish and lack a planned health program. The American public does not know that a medical vacational guidance is advisable for the healthy person and that for the sick person it is imperative.

Climatotherapy in General Practice

The human being and his climatic environment compose a biologic unit. One may consider a human being adapted to his climatic environment if

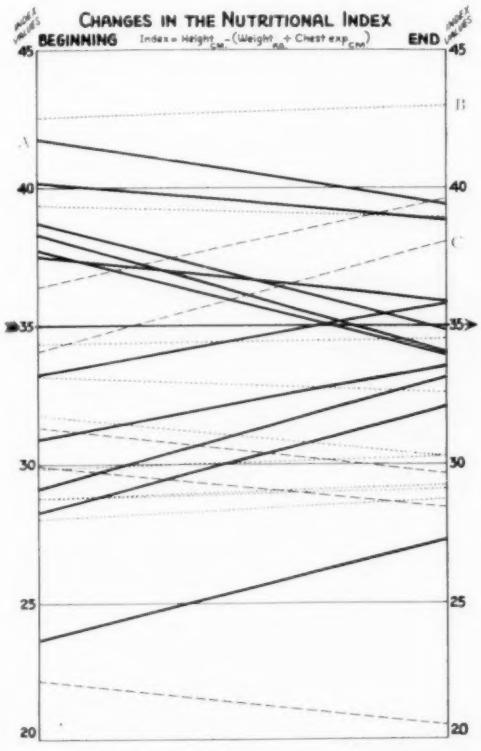

Fig. 4. — *A*, ——— desirable changes, converging toward the average value (35) in 47 per cent of the children; *B*, ... insignificant changes observed in 36 per cent; *C*, - - - - - - undesirable changes observed in 17 per cent.

he is able to endure extreme fluctuations in his home climate without physical damage. A large percentage of healthy and chronically ill Americans are maladjusted to their climatic environment. The climatically maladjusted patient, his comfort zone narrowed by his mode of living and dictated by habit or disease, is sadly out of place in the Northern winter and spring time turbulence of the atmosphere. It is the duty of the general practitioner to determine whether the patient should be hardened up to his own climate or should escape from it. Whether climatic stimulation or

sedation is needed, the general practitioner is the one who probably will have to select the site of the new climatic environment. In so doing he has to take into consideration the condition, constitution and, especially, the social and financial background of the patient. One of his most important obligations to his patient is to provide him with the name and address of a reputable medical practitioner at the site of the prospective vacation. Lastly, he should provide his patient with a regular medical passport containing sufficient data to enable the recipient physician to comprehend the medical problem of the migrant. This "medical identification card" will be very useful in vacational guidance, in the planning of therapy and especially in case of emergency. The recipient specialist or general practitioner should try his utmost to cooperate with the sender in acknowledging the arrival of the patient, giving his impressions of the case and outlining the therapy to be instituted. This friendly cooperation will enhance the after-care and will make possible the long range planning so important in the treatment of the chronically sick. In this long range planning in the treatment of chronic diseases, climatotherapy will play a useful and important role.

A Challenge to the Physician of the South

Several million Americans yearly escape the hardship of Northern winters, selecting the American Southland as vacation ground. Florida and California receive the majority of these migrants, but a goodly percentage go to other Southern states. If the migrations will become medically directed, if the vacations will become based on scientific facts instead of on hearsay evidence, the future of American climatotherapy will be assured.

SOME ROENTGEN RAY FINDINGS WHICH MAY BE RESPONSIBLE FOR LOW BACK PAIN *

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Cleveland Clinic

CLEVELAND, OHIO

Low back pain constitutes one of the most difficult problems in diagnostic accuracy in medicine, and the possible etiologic factors in this syndrome are almost unlimited. For this reason we shall choose some roentgenologic findings in the lumbosacral region which are rather definite etiologic entities. The first of these are tumors involving the vertebrae. These constitute both benign and malignant primary tumors and also metastatic lesions. We shall consider tumors first, as so often patients are treated for long periods without proper radiologic examination of the spine and consequently the disease progresses until pathologic fracture of a vertebra occurs.

First of the primary bone lesions of malignant origin is the osteogenic sarcoma, which usually involves the lateral aspect of the vertebral body, with destruction of the cortex on the affected side (fig. 1) and consequent partial collapse of the body as the destruction progresses. The question of differential diagnosis is a question of primary bone tumor, tuberculosis of the spine or fracture. Tuberculous infection will involve the adjacent joint

* Read at the Twentieth Annual Session of the American Congress of Physical Therapy, Washington, D. C., September 4, 1941.

and if advanced will destroy the joint cartilage and erode the adjacent vertebrae, resulting in kyphosis as the vertebrae collapse. In the consideration of fracture, the history of trauma may be ascertained together with the compression of the vertebrae. There is usually a lateral angulation of the compressed vertebrae if the trauma is of sufficient magnitude to be confused with tumor or tuberculosis. When myeloma is considered there may be one or more collapsed vertebrae, with marked osteoporosis of the entire spine, and lesions should be searched for in the ribs, a study for Bence-Jones protein should be made and a sternal marrow puncture should be done for plasma cells. The last is of extreme importance, as the absence of such cells rules out myeloma and indicates a probable metastatic malignancy.

A metastatic malignancy should be suspected in the case of severe low back pain. When there is a history of a primary carcinoma it should be kept in mind that metastatic malignancy in the vertebrae may be present before any change can be determined radiologically in the vertebrae. As

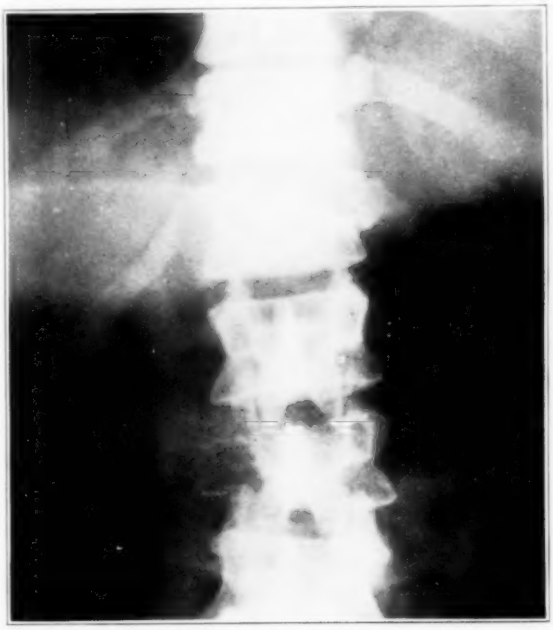

Fig. 1. — Osteogenic sarcoma L2 left side.

the growth increases the tension in the bone, severe back pain becomes evident and metastases should be suspected. Metastasis is carried to the bone by the blood stream, and the initial development is in the interior of the vertebral body. As the disease progresses the vertebral body collapses and there is increased tension in the bone, eventually producing severe pain and leaving the adjacent cartilage intact on each end of the bone, which clearly differentiates this disease from tuberculosis of the spine. However, the two conditions may produce a similar type of kyphosis. Benign tumors, such as giant cell tumors, chondromas and osteomas, show a rather characteristic development radiologically and will not be discussed here.

Second, we shall discuss sprains, which are tissue reactions to excess motion beyond the normal limit of the ligamentous apparatus. Strains may be disabling without radiologic evidence of pathologic change. This is particularly true when the injury is superimposed on a spine previously affected

with hypertrophic bone changes, a process we call osteoarthrosis. Inflammatory change or active arthritis may be absent. We believe that the diagnosis of osteoarthritis of the spine is often erroneous and in many instances has been responsible for depriving the patient of just compensation for disability due entirely to trauma. We have arrived at such a definite conclusion after the examination of spines in many thousands of roentgenograms made for the purpose of investigating the urinary tract. Most of the patients are past middle age, and the vast majority have marked osteoarthrosis. They seldom give a history of symptoms referable to the spine. From the radiologic examination it seems appropriate to make a diagnosis of osteoarthritis of the lumbar spine; but many of the patients with extensive involvement can flex the spine and bend in any position without symptoms and give a history entirely free from past or present pain or disability in the lumbosacral region which may be attributed to bone or joint disease. The correction of the disease of the urinary tract usually eliminates all pain complained of in the lower spinal region.

Fig. 2. — Failure of fusion of epiphysis of the inferior articular process, L_4.

Anomalies may be responsible for an abnormal postural status with resulting low back pain. However, before a sacralization of the fifth lumbar vertebrae or a rudimentary spina bifida is considered as the cause of the disability, all other possible etiologic factors should have careful consideration.

As anomalies are of long standing, the bones and joints of the lumbar spine and its supporting ligamentous structures become well adjusted to them. Failure of fusion of the lamina of the vertebrae theoretically should explain low back pain, and much has been written to explain the x-ray projections necessary to locate the anomalies, which may often be only small fissures. Nature has compensated for such a deficiency by increasing ligamentous support. We carefully observed a large group of patients who had laminectomy of one or more lumbar vertebrae and found low back pain to be rather the exception than the rule, and we feel that this condition is seldom the actual cause of low back pain.

The inferior articular processes are also of importance, because an anomalous failure of epiphyseal fusion may simulate a fracture and be misinterpreted in the presence of a low back pain following an injury. Careful observation will reveal a joint-like line across the process, with regular, smooth borders, while a fractured line will be irregular and have a definite separation of the fragment. Separation anomalies may also be bilateral (fig. 2).

The inferior articular processes may be long and with some narrowing of the joint spaces between the vertebral bodies produce erosion of the base of the pedicle of the adjacent vertebrae above and may be a logical etiologic factor in the production of low back pain. These, however, are rare and usually occur at about the level of the third and fourth lumbar vertebrae. Oblique projections of the spine are essential in ruling out this possibility (fig. 3).

The lumbosacral joint is a potential source of low back pain. It may articulate at an angle with the sacrum, often almost perpendicular, with consequent lordosis and may show no clinical evidence of pain. A true spondylolisthesis, however, usually will cause disabling symptoms and will

Fig. 3. — Erosion of pedicle base of adjacent vertebra by malposition of lateral articular process.

require support either by mechanical or by surgical means before permanent relief can be obtained. The radiologic study is done with the patient in the upright and direct lateral positions. However, if the condition is of sufficient magnitude to produce symptoms it is usually best demonstrated in the horizontal position (fig. 4).

No consideration relative to low back pain is complete without some attention to the sacroiliac joint. The value of visualization from several projections in the radiologic study is emphasized by many writers and we

believe is of considerable importance. The popularity of sacroiliac strains and slips of the joint has been relegated almost into obscurity by the popularity of the "herniated nucleus pulposus," and due consideration should be given to the sacroiliac joint as a source of low back pain.

It is well to remember that study of a case in which the symptoms suggest a herniated nucleus pulposus may show no evidence of such a condition.

Fig. 4. — Marked spondylolisthesis, L5.

Fig. 5. — Exstrophy of bladder. No bony support to anterior pelvis.

In such cases further study may be made to determine the disease present, and the pathologic sacroiliac joint is still a possibility.

We believe, however, from long experience in examination of this joint that unless there is gross displacement or definite bone disease about the joint the likelihood of small slips or other trivial changes may be dismissed as of no clinical importance (fig. 5). The reported cures by fusion of this joint and other operative procedures have always been accompanied by rest, fixation of the lower back and adequate physical therapy, which is ideal treatment for many or most lesions in this area, most of which (even the herniated nucleus pulposus) are relieved from pain completely or at least temporarily.

The herniated nucleus pulposus is at present a popular star and we believe rightfully so. The nature of this structure indicates that it was not intended to support the burden man has placed on it in assuming an erect posture. The fibrous annulus, which surrounds the semiflexible nucleus, is weak in the posterior portion on each side of a strong posterior spinous

Fig. 6. — Herniated nucleus pulposus, L4-5.

ligament and lends itself readily to the site most amenable to rupture, the protrusion extending either to the right or to the left. This herniated mass extends into the foramen of the corresponding side, with compression of the dural reflection, or nerve sleeve containing the nerve emerging at this point (fig. 6). This results in pressure by the mass and edema of the adjacent structure, causing apparent sciatica, with pain referred down the leg and often into the foot. Atrophy of the muscle in the calf of the leg and some disturbances of the achilles and patellar reflexes may be demonstrated.

It is evident that in the presence of this syndrome herniated nucleus pulposus should be suspected.

With the clinical syndrome a definite diagnosis is imperative. In our experience the radiologic examination is the only definite diagnostic agent. A good clinical history is essential, with careful physical examination and elimination of disease of organs outside the spine which may produce low back pain. A well made roentgenogram of the lumbar spine and pelvis is essential to determine evidence of lesions in the bony structures and joints of the lumbosacral region. The finding of a narrow intravertebral joint space is not of great significance in the diagnosis of a herniated nucleus pulposus, as this is rather the exception than the rule. If after these procedures no proved cause can be found for the patient's symptoms, a spinogram is indicated to visualize the spinal canal and to determine the presence or absence of nerve root pressure. Five to 10 cc. of thorium dioxide (thorotrast) is introduced into the spinal fluid with the patient in a position which maintains the lower spinal canal at a dependent level. This opaque medium readily diffuses with the spinal fluid and goes into the meningeal envelope, or nerve sleeve, to outline the position and presence or absence of compression. Fluoroscopic observation is carried out during the injection of thorotrast. Roentgenograms are then made in the posteroanterior positions, right and left oblique views and lateral projections and in the upright position if desired. The patient is returned to bed with the upper canal still elevated and spinal drainage instituted for the removal of 85 to 90 per cent of the opaque medium. This procedure was perfected by Dr. W. A. Nosik, of the Cleveland Clinic, and in our experience is devoid of any untoward after-effects.

If no herniated nucleus pulposus is found no operation is performed and the clinical diagnosis is proved to be in error. If the findings are uncertain or a tumor of the cord is suspected iodized poppyseed oil (lipiodol) is introduced into the spinal canal and the entire canal studied. The spinogram with thorotrast is useful only in lesions in the lower lumbar and sacral regions. The symptoms of ruptured nucleus pulposus, however, are so typical that a negative roentgenogram is encountered only occasionally.

The injection of air has proved unsatisfactory in our experience. Ruptured nucleus pulposus is a recurrent disease with recurrent bouts of symptoms, so that rest, fixation and adequate physical therapy may temporarily relieve the symptoms. However, if the symptoms are abated this should not lead one to believe that the disease is not present. The surgical treatment of the condition is now well established. From the reports in the literature and from our experience with 200 cases recurrence appears to be rare following surgical treatment.

PERIARTHRITIS OF THE SHOULDER: COMPARISON OF RESULTS OBTAINED BY PHYSICAL THERAPY AND BY ROENTGEN THERAPY *

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Periarthritis of the shoulder is a term used to describe a relatively common extra-articular disorder of this joint. This syndrome is often described as subdeltoid or subacromial bursitis, periarthritis calcarea, calcification of the supraspinatus tendon and Duplay's disease. From a pathologic point of view, the bursae or the tendons are not the only structures involved; hence the term periarthritis appears to be both sufficiently noncommital and sufficiently specific.

The cause of the disorder is unknown. Many authorities believe it to be trauma, either acute, such as a slight blow to the shoulder, a fall, or a trivial injury such as that incurred in throwing a ball or reaching to a top shelf, or chronic, such as repeated slight insignificant trauma, which escape the patient's attention. Infection has been considered an etiologic agent because the pathologic changes observed are characteristic of an inflammatory process. The various foci of the body, such as the teeth, tonsils and sinuses, have been incriminated. Endocrine irregularities have also been suggested. Dickson[1] maintained that "glandular dysfunction and foci of infection would seem to be much more important as etiologic factors than trauma." From our experience the syndrome of the menopause frequently accompanies this type of periarthritis.

The clinical picture is characterized by a rather sudden onset of pain in the shoulder, which may or may not radiate down to the hand or up to the neck. The pain is frequently so intense that the patient cannot move the arm and holds it firmly to his side. Tenderness is most marked over the greater tuberosity of the humerus, the site of the subdeltoid bursa. Another frequent point of tenderness is at the anterolateral border of the acromion, with involvement of the tendon of the supraspinatus, or there may be a point of tenderness more posteriorly, just outside the border of the scapula, when the tendon of the infraspinatus is affected. The movement of the arm is limited in all directions, but abduction and rotation are the motions most severely restricted. Occasionally the onset may be less acute, with the patient complaining of increasing discomfort and immobility of the shoulder.

The diagnosis of a periarthritis is established either by roentgen examination or by the typical clinical symptoms and signs. The presence of a calcium deposit shown on the roentgenogram is recognized as the most convincing evidence for the diagnosis. However, calcium may be present in the region of the shoulder joint without giving rise to symptoms. In an examination of over 6,000 shoulders, Bosworth[2] found that 11 per cent of the patients who had calcium deposits had had no symptoms piror to the examination. Furthermore, the roentgenologic technic is sometimes difficult, and if roentgenograms are not taken in several planes the deposits may be obscured by overlying bony structures. Several roentgenologists insist on fluoroscopic or stereoscopic examination, but although this proce-

* From the Departments of Medicine and Radiology, Western Reserve University at City Hospital, Cleveland, Ohio.
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dure is highly desirable it is not always practicable. Therefore the diagnosis of periarthritis of the shoulder may be made by the characteristic symptoms with or without the presence of a calcareous deposit shown on the roentgenogram. In this series, approximately 50 per cent of the patients had a definite shadow in the region of the shoulder on roentgen examination; however, the clinical history and the examination of the other patients were considered sufficiently diagnostic. Patients who had pain in the shoulder but who had multiple arthritic involvement were excluded as well as patients who had pain in the shoulder following fracture, dislocation or definite severe trauma. No doubt the latter condition should be diagnosed as periarthritis of the shoulder, but since the cause is known the patients do not fall into the group under consideration.

The treatments of periarthritis have been numerous and varied, with the choice depending on the special interest of the investigator. For many years various surgical measures were considered the most effective if not the only form of therapy, but since other more conservative measures have become available, surgical intervention has been reserved for the more resistant or neglected conditions. In 1923[3] the first report of the successful treatment of subdeltoid bursitis with diathermy was published. Since then many articles have appeared which have definitely established this physical agent as a most helpful means of relieving this disorder.

During the past few years roentgen therapy of different arthritic joints has been advocated, although as far back as 1897 Sokolow first attempted it in a large series of cases. More recently papers[4,5,6] have appeared which have shown the excellent results which can be secured by roentgen irradiation for this disease. In an effort to compare the effects of diathermy and roentgen therapy, a series of patients were treated at the Cleveland City Hospital.

In the use of diathermy the electromagnetic induction coil was used. Two machines were employed, one with a 22 meter wavelength and the other with a 25 meter wavelength. The usual technic was to apply the coil so as to cover the entire shoulder both anterior and posterior and, if possible, with a loop, encircling the axilla. For the more acute conditions the current was allowed to flow for three to five minutes, discontinued for a minute and then repeated until the patient had received about fifteen minutes for the first treatment. Subsequently the duration of the treatment was extended to a maximum of twenty minutes. For the more chronic conditions the current was allowed to flow for twelve to fourteen minutes continuously for the first treatment, with subsequent treatments gradually increased to the maximum of twenty minutes. The treatments were given three times a week. No other therapy either by physical agents or by medication was given.

The technic for the roentgen irradiation was as follows: an anterior, a posterior and a lateral field from 10 to 12 cm. square was employed. Only one field was treated at a time, and treatments were given every other day. Two hundred roentgens were given per treatment, 200 kilovolts, 20 milliamperes and a 50 cm. target skin distance being used. Filtration was 0.75 mm. of copper and 2 mm. of aluminum, which gave a half value layer of 0.9 mm. of copper.

The patients in this group were from the out patient department of the Cleveland City Hospital. Fifty consecutive patients were selected and treated alternately by the two methods. Before either type of therapy was started the patient was thoroughly examined, the motion of the joint was measured by a goniometer and a roentgenogram was taken. The two groups will be analyzed separately and then the results compared.

Among the patients treated by diathermy there were 15 men and 10 women. The average age was 53 years. Only 1 patient was less than 40. The average duration of the disorder was approximately two and one-third months; 10 patients had their symptoms less than one month. The onset was acute in 16 patients and gradual in 9 patients. The right shoulder was affected in 16 patients and the left shoulder in 9. Definite deposits of calcium were found by roentgen studies in 12 and no evidence of any calcareous deposits in 13 patients.

In classifying the results the following arbitrary standards were adopted: "Cured," signifies no pain either subjectively or objectively and normal motion in all directions. "Markedly improved" indicates that pain was present either by palpation or subjectively but that the motion was normal. "Moderately improved" designates some evidence of pain and indicates that though the motion was not normal the mobility had improved more than 50 per cent. "Improved" means that pain was still present and that the motion showed some improvement but was less than 50 per cent. "No benefit" denotes no relief of pain or increase of range of motion and indicates that the therapy was of no help.

The results with the use of diathermy were as follows:

	No.	Percentage
Cured	6	24
Markedly improved	9	36
Moderately improved	5	20
Improved	4	16
No benefit	1	4

Thus 60 per cent of the patients were either entirely relieved of all symptoms or had but a minimal amount of tenderness or pain in the region of the shoulder.

The average number of treatments for all patients treated with diathermy was nine, or approximately three weeks of therapy.

The analysis of the results as to duration, onset and presence of calcium are shown in the table 1.

TABLE 1.—*Results of Physical Therapy.*

	Duration	Onset			Calcium	
	Average, Months	Acute	Gradual	Treatments	Present	Absent
Cured	3.5	2	4	8	4	2
Markedly improved	3	7	2	9	4	5
Moderately improved	3	3	2	11	2	3
Improved	2	3	1	9	1	3
No benefit	1	1	....	6	1	....

From the 25 cases presented it is seen that the duration of the disorder and the number of treatments given are about the same for the different results secured. The onset of the disease and the presence or absence of calcium are too variable to draw any conclusions. Thus, for the patients treated by this type of physical therapy the duration and onset of the disease, the number of treatments and the presence or absence of calcareous deposits are not factors which would influence the results.

Among the patients treated by roentgen therapy there were 9 men and 16 women. The average age was 48 years, slightly less than that of the patients in the other group. The average duration of the disease was approximately one month, which is less than for the patients treated by diathermy. The onset was acute in 19 patients and gradual in 6. Twelve patients had the symptoms in the right shoulder, 11 patients had them in the left and 2 patients had them in both. Calcium deposits were found in 12

patients, and the roentgenograms of 13 were negative, figures which are identical with those for the other group.

Roentgen therapy secured the following results:

	No.	Percentage
Cured	4	16
Markedly improved	11	44
Moderately improved	5	20
Improved	4	16
No benefit	1	4

These results show that the treatment by roentgen rays cured or markedly relieved a total of 60 per cent of the patients. All except 3 patients received the course of therapy which meant 6 treatments during two weeks.

Further analysis of the results secured by roentgen therapy are shown in table 2.

TABLE 2. — *Results of Roentgen Therapy.*

	Duration Average, Weeks	Onset		Treatments	Calcium	
		Acute	Gradual		Present	Absent
Cured	2¾	3	1	6	2	2
Markedly improved	2½	9	2	6	6	5
Moderately improved	3½	5	....	6	2	3
Improved	9	1	3	6	2	2
No benefit	6	1	....	6	....	1

These figures, like those of the diathermy cases, show that the length of the disorder, its mode of onset or even the presence or absence of calcium does not materially influence the results. There is the exception in the duration of the disease for the 5 patients who received the least benefit from roentgen therapy in that they had symptoms for several weeks longer than the other patients in the series. It should be mentioned that of these 5 patients 4 were given routine physical therapy after they had completed the course of roentgen therapy. Only one of the four was relieved of any symptoms or showed improvement objectively.

A final comparison of the two methods is shown in following tabulation:

	Diathermy, Percentage	Roentgen Rays, Percentage
Cured	24	16
Markedly improved	36	44
Moderately improved	20	20
Improved	16	16
No benefit	4	4

The final results are practically identical. In the analysis of such factors as duration, onset and presence of calcium deposits, the figures also tend to establish the fact that both modalities secure approximately the same effect.

From these figures it would seem logical to state that the use of diathermy and roentgen rays effect the same results.

Summary

Periarthritis of the shoulder is a relatively common disorder which has been treated by a variety of methods.

The comparison of the treatment of 50 patients by diathermy and by roentgen rays shows that the results are identical.

Both methods are capable of securing relief in a large percentage of patients in a relatively short time.

(*Concluded on page 627*)

ELECTRICAL ACCIDENTS: SHOCK, BURNS AND GLARE INJURIES TO EYES *

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The electrical profession looks to the medical profession for consideration and assistance both in safeguarding and in cooperating in meeting the hazards attendant in the use of electrical energy in the home, field and factory.

The medical profession has made some extensive studies on this subject, and brilliant research work has been done through animal experimentation, but, owing to the many variables present in animals, the findings do not always work out the same for the human body in accidental electrifications.

In the present era of suspicious and destructive criticism arising out of the past years of economic depression, people are prone to study with a searching eye the services we render as medical men and women. It is therefore to our advantage to acquaint ourselves with electrical accidents and be prepared to give our services beyond criticism in time of such emergencies. When criticism arises after electrical accidents, the physician in many cases was not to blame for his error of judgment but in others no excuse can be given for lack of proper procedures. The physician, therefore, should acquaint himself with the basic factors underlying electrification and know what are the essential remedial measures to be instituted.

People in general have become so used to seeing artificial respiration performed on persons apparently dead that they have come to expect such aid from the physician, and when it is not given they believe that all was not done for the patient. Litigation for malpractice might arise out of such situations.

One of the most prevalent fallacies held by physicians and laymen is that any person shocked with a high voltage current must necessarily be dead and that it is useless to work on him with a hope of reviving him. Many times a physician on arriving at the scene of the accident and being told of the high voltage with which the person has been in contact has made a superficial examination, pronounced the patient "dead" and left the scene of the accident, only to be summoned later to find that the patient has been revived by artificial respiration performed by some layman. This is not said in any spirit of criticism but only to emphasize the fact that such mistakes do occur and reflect on the medical profession.

A certain voltage may be fatal to one person, while under like conditions it may only trivially affect another. It is a fact that the person who contacted the high voltage current did not receive all the voltage, inasmuch as the current may be dispersed over the body skin surfaces and go off harmlessly into the ground. Again, the resistance of the skin surfaces of the patient's hands and body to the current may so reduce the voltage as to permit entrance of only a portion of the full voltage, which may produce a cessation of respiration. Unless the laboring respiration center in the brain is aided by artificial respiration at once and supported until normal function is reestablished, the outcome is doubtful.

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The three essential factors to keep in mind regarding cases of electric shock are:

1. Look on all electrical apparatus with awe and respect, regardless of whether it is of low or high voltage.

2. Look on as alive all persons who have suffered an electrical accident and are unconscious and treat them by artificial respiration regardless of the voltage contacted.

3. All physicians should give encouragement and cooperation to the laymen who are endeavoring to maintain the flicker of life until the doctor arrives.

Nature of Current

What is the nature of the current producing these electrical injuries? The two main sources of energy are the continuous, or direct, current and the alternating current. The latter current is said to flow first in one direction and then to reverse itself and flow in the opposite direction. These alterations, or reversal of current flow, occur many times in a second. The frequency of the alterations if few within a second's time is known as low frequency; 30 to 60 cycles is the one most used in industry and is the one most dangerous to man. If the alterations are at a high rate — say, a thousand or more per second — the current is high frequency and the dangers to life are much less.

Of the two major currents, the direct is found to be less dangerous than the alternating, all things being equal. As to the voltage, it is now accepted that the low voltage has a tendency to throw the heart into ventricular fibrillation providing the heart is within the pathway of the electric current within the body. The higher voltage affects the central nervous system, causing an inhibition or block of the respiration center in the brain. This results in cessation of breathing, and unless artificial respiration is performed complete anoxia develops, with heart failure and stoppage of the blood circulation. If this occurs, resuscitation is impossible. High voltage sustained for any appreciable time will cause heart death as well as asphyxial death from respiratory stoppage. The heart fibrillation from low voltages is fatal, while the respiratory paralysis so often associated with high voltages may be overcome by artificial respiration performed until the respiratory center is able to overcome the inhibition and carry on itself.

In the field where these accidents so often occur, we are unable to tell which form of apparent death we have to deal with, as we must depend on the layman who is the first to render assistance to the victim. We must therefore take for granted that all cases of unconsciousness from electric shock are but cases of temporary suspended animation and institute artificial respiration at once, persisting in its performance until success or failure is apparent.

Alternating current produces more severe muscular contractions than does direct current; this often results in the victim's "freezing" to the electric conductor and being unable to free himself from the current, thereby increasing the duration of time that the current is flowing into his body. The longer the exposure to the current flow, the less the possibility of his resuscitation.

One of the factors determining the severity of electric shock is the current intensity, which is measured in amperes. At the time of an accident it is impossible to determine the amperage of current that enters the body, as the individual skin resistance to the passage of the current is not known. It is well to consider all electricity as dangerous and not depend on any stated safe limits. Experiments have shown that in alternating current 8 to

9 milliamperes of a 60 cycle current is reasonably safe while in direct current 80 milliamperes is a conservative estimate of safety for man.

Another factor determining the severity of electric shock is the character of the ground connection, i. e. whether wet or dry. The former offers less resistance to the current flow through the skin, while the latter offers a greater resistance to the passage of the current and as a result generates greater heat in the tissues and hence produces greater destruction of the tissues. With a wet, perspiring skin the resistance is low, more current entering the body, the shock being more severe and the possibility of resuscitation much less.

In the hot months of summer the mortality rate of electrical accidents is greater, and this is attributed to the fact that the clothing is soaked with perspiration, thereby making the grounding more favorable to current flow. Much of the current is dispersed over the skin surfaces of the dry body, and hence less current actually enters the body.

The nature and the size of the contact likewise determine the severity of electrification. If the contact is firm and snug and fits the contour of the body area, then the shock is more severe. In high tension electrification the person need not actually contact the current conductor to receive a burn, as the current may arc over to the body. At the instant of contact with the current the muscular reaction may be so great as to cause a generalized muscular contraction, thereby throwing the person away from the conductor.

If he was not injured by the fall, the chances are that he did not receive a severe shock, owing to his being thrown away from the conductor. He was not in contact long enough for the current's intensity to enter his body, nor was he in perfect contact with the conductor, so that the contacting area was of insufficient size to permit entrance to the body.

The duration of the current flow into the body is in my opinion the most important factor governing the severity of the electric shock. Experience shows that for every second that a man is in contact with the current flow his chances of recovery are much less. Those who are thrown away from the conductor receive little current into the body and require very little artificial respiration. Those who are able to free themselves from the electrical contact by their own efforts and who are in contact with the current a little longer, receiving more current flow, are moderately easy to resuscitate, but when a man is in contact with the current and must be rescued by another person a certain amount of time must elapse, so that the current flow into his body is of longer duration, often in minutes instead of seconds. This is when there is difficulty if not failure in resuscitative efforts.

The current pathway in the body is of the utmost importance in the severity of electrification. If it passes through the heart area it is invariably fatal. When the current breaks down the skin resistance and enters the body it spreads out radially and collects again at the point of exit from the body (ground). The most damage is done at the point of greatest current density; hence the severe burns that are so often present at the points of entrance and exit of the current. If a vital organ lies within the pathway of the current there is damage in proportion to the density of electric current. If chemical changes take place within the individual cells of the tissues of the body, as is evidenced during the prolonged flow of current, then the change of the chemical contents of the cells are so damaged and their vitality so impaired that recovery is impossible.

Nature of the Shock

Arteries and veins are the best conductors of electric current, through the fact that they are tubes carrying a fluid of salt contents. If current is

applied for a long period there is a general diffusion of that current to all parts of the body by these blood-carrying channels.

The network of nerves of the cerebrospinal or central nervous system carries energy to the various structures of the body from the brain (power house) through the spinal cord (transmission lines) to the various nerves of the body (service lines). It is over this nervous network that electric current is sent to the center of respiration in the brain, causing a short, or producing respiratory paralysis.

From the foregoing description it may readily be seen that electric shock is not simply a local action, causing damage to a single locality, but rather that the various tissues and organs of the body are so interconnected that the flow of current when prolonged makes recovery well nigh impossible.

What can be expected in the way of complications following shock or electrification? Are the cases reported in the literature sufficient to prove that conditions found postmortem were due to the electrification, and the antemortem complications a direct result of previous electric shock? All that I know about electrical accidents is what I have seen during the past twenty-nine years in actual field work and the experience I have gleaned from hundreds of electrical accidents during these years. To the first question I will make the assertion that barring the cases in which actual parts, or structures, have been destroyed by the burns received from current flow we have not found one case of resulting complications or any permanent or remote effects following electrical accidents. In view of the many articles appearing in the literature and the reports of litigation, numerous pathologic conditions have resulted a few weeks to two years after the alleged electrification. This may seem an exaggeration, but the statement is based on the fact that for twenty-nine years there has been an annual periodical medical survey of all of our employees, so that they have been under constant observation for injuries and illnesses and it has been possible to know what physical defects were present prior to and after electrification.

There have recently appeared in the medical literature reports on cases of coronary and other heart lesions resulting from electric shock and of abnormalities in the central nervous system said to have been caused from slight or moderate electrification. It is my opinion, however, that knowledge of the patient's pre-electrification physical condition is essential to prove definitely whether the condition had existed undetected before his accident.

After electric shock some mental and nervous confusion and partial inability to coordinate certain muscle groups are found. Likewise, there is a seeming paralysis in an extremity, but careful examination reveals that the patient does not move the part because of pain in the burned area. These abnormal conditions arising after electric shocks are transitory.

Methods of Resuscitation

Many cases of electric shock occur in remote places where medical authority is not available; therefore, a certain amount of time must of necessity elapse before the arrival of the physician. Because of the need of immediate resuscitative measures, it is of paramount importance that the properly trained layman be substituted for this first aid service until the arrival of the physician. The simplest method and the one which is easily learned by the layman, as shown by years of experience in industry, is the Schafer prone pressure method of artificial respiration. This method is easy to perform and can be carried on for long periods by one person without inducing fatigue. The results need no embellishment in this paper, as it is common knowledge in the medical profession that this is the method of choice.

A new method that has recently come into use by the public utility companies is known as the Pole Top Resuscitation method. It was devised and first put into use by Mr. E. W. Oesterrich, of the Duquesne Light and Power Company, Pittsburgh, 1931. This method is for use in the resuscitation of linemen working on energized circuits at pole tops. When a lineman becomes unconscious from electric shock he is immediately given artificial respiration on the pole by his fellow workman. There have been reports of excellent recoveries with this method.

Prior to this Pole Top Resuscitation method it was necessary to rescue the victim, lower him to the ground and there perform the Schafer method. The delay in starting resuscitation due to the time lost in bringing the victim to the ground often causes resuscitation to fail. The Pole Top method consists mainly that the first man to reach the victim clears the body from electrical contact permitting the body to hang from the safety strap alongside the pole if possible. The rescuer then takes a position below the victim on the pole and after placing his own safety strap around the pole, proceeds to work his way up the pole with one leg of the victim on either side of the safety strap, and with the body of the victim between himself and the pole. When the safety strap is as high on the pole as can be reached, the weight of the victim's body is taken in a straddle position on the safety strap of the operator.

The mouth of the victim is cleared of foreign substances, the tongue pulled forward and the head pushed toward the pole. The operator then encircles the waist of the victim, placing both hands, one from each side, on the abdomen of the victim, with the thumbs below the lower ribs and the fingers touching.

The operator applies a constricting action with his arms and hands, obtaining a compression force in an upward direction on the abdominal region. This compresses the abdomen, forcing the abdominal contents up against the diaphragm, which in turn causes the lungs to be emptied of air. The pressure is released, allowing the abdominal organs with the aid of gravity to resume their normal positions. This aids in the inspiratory phase of respiration. The pressure is reapplied about twelve to fifteen times per minute until the victim regains consciousness. Additional workmen prepare the necessary rigging that permits the lowering of the victim to the ground.

This method has shown fine results, and Mr. Oesterreich is to be highly commended for his great contribution to the field of resuscitation.

This paper is likewise to present information regarding electrical burns and glare injuries to the eyes, but I shall only be able to give a very brief résumé.

When a patient who has been unconscious from electrification has been reanimated, he is a "live" patient on whom to work and also direct attention to other injuries that may be present. However, anything that requires surgical treatment should be given careful consideration, and such treatment should be postponed if possible until the patient has recovered from shock. Should fractures be present it is best to immobilize them for the time being in temporary splints, putting the parts at rest and reducing them at a later date. This is especially true with regard to a femur fracture, with which there is a possibility of added femur shock if reduction is attempted. Skull fracture should be watched very carefully and treated symptomatically until the patient is in a condition that makes radiography and subsequent treatment safe. The cardinal feature in the therapy of electric shock is rest until after reaction sets in. Too early operative intervention often accounts for a fatality that would not have occurred if the patient had been otherwise treated. Surgical repair of burns following electrification should be given

careful thought before it is attempted, as it is often difficult to determine the extent of the destroyed tissues. Hemorrhage once produced is difficult to arrest, and the danger of secondary hemorrhage is great.

It should be borne in mind that in addition to the electric shock there is present psychologic shock and traumatic shock, and that the patient needs rest without the addition of surgical shock to his already depleted strength.

Electric burns are aseptic at the time of accident, and there is little danger of infection during the first forty-eight hours because of lack of absorption by the tissues. Frequently after forty-eight hours a so-called toxic shock develops owing to the absorption of toxins from the destroyed tissue, and it may be accompanied by bacterial invasion. This toxic shock has often been mistaken for pneumonia, etc., with fatal results.

Most electric burns are painless, much less painful than burns from fire or hot liquids. Hemorrhage is practically absent even when large vessels have been destroyed, and secondary bleeding is expected and to be feared when reaction sets in and the blood pressure rises. The patient may appear more gravely ill than the extent of the burns seems to warrant; and vice versa, a patient may be terribly burned and still show few systemic symptoms. The prognosis should be guarded for the first four days.

Glare Injury

Electric flashes or glare injury to the eyes is one of the most common forms of electrical accident. Very little is written about it, as the person so afflicted has a short period of disability, not more than a few days at the most, except when he desires to make his case one of litigation. My only reason for mentioning this is the many claims that arise for damages alleging permanent injuries resulting from such flashes.

How do these flashes occur? When metal contacts electric current there is a formation of an arc of high temperature which produces a blinding glare of light rich in ultraviolet rays. The flash may reach the patient's eyes, providing he is close to the arc, and produce an actual burn. This is a rarity, as in most cases there is no actual contact with the flash, but the heat and the ultraviolet rays may produce a reddening of the skin surfaces, while the brilliant light resulting from the flash causes the pupils of the eyes to be violently contracted and the mechanism of the eyes to receive a powerful stimulation. The visual purple in the retina of the eye becomes completely blanched, and temporary dimness or fogging of the vision, which is transitory, results.

The nearness and the intensity of the flash determine the severity of the symptoms. Many persons receive the same condition from watching an electrical arc welding operation on streets and buildings during construction.

Generally within forty-eight hours all symptoms disappear and the acuity of vision is not disturbed. In twenty-nine years of observing this class of accidents, I have seen thousands of electric flash injuries, and in no case has permanent damage to the vision developed. Many claims are made by persons who blame some previous flash for the development of cataracts, pterygerium, glaucoma and failing vision. If this were so, we in our medical department would have experienced such alieged complications. Here again our annual medical convention with careful examination of the employee's eyesight has demonstrated the value of such an examination in the combating of such claims.

Conclusion

Permit me to give you what to my mind is essential if we are to safeguard employees and the public from electric hazards. As physicians we should stress the preventive side of such accidents as we know that lack of

understanding of the forces of electricity is the one great cause of electrical accidents.

1. Education of the employee and the public in accident prevention.
2. Proper installation of all electrical wiring and equipment by the electrical contractor.
3. Competent maintainence by qualified electricians and elimination of the so-called "handy man" in making repairs.
4. Competent and periodic inspection of all electrical installations.
5. Safe and foolproof manufacture of electrical appliances, equipment, and prohibiting the sale of cheap, unsafe materials.
6. Inspection prior to the issuing of insurance coverage by the insurance carrier on all installations.
7. Use of electrical equipment for the purposes intended.
8. Instructions to the public in the methods of rescue and education in the performance of artificial respiration.
9. Postaccidental investigation of all accidents with a standardizing of the methods of reporting such accidents, and the establishment of a clearing house of information as to electrical accidents with the full cooperation of the medical and electrical professions.
10. The inclusion in the curriculum of our medical schools of a course in electrical accidents, with adequate interne training in meeting these emergencies, and instruction of the graduate physician in general practice, thus acquainting him with the hazards of electricity and how to meet such emergencies as they arise.

This is not an idealistic theory given without careful thought and consideration but it is a practical solution that can be put into operation without expense or much personal effort. It would soon reveal its true value in the reduction to a minimum of electrical accidents with their attendant suffering and death.

79 West Monroe Street.

TECHNICIANS' EXAMINATIONS

The American Registry of Physical Therapy Technicians announces that examinations for Registered Physical Therapy Technicians will be held in various cities as the demand arises on dates to be announced later, during December 1941 and January 1942. Applications should be filed as early as possible. Write to the American Registry of Physical Therapy Technicians, 30 North Michigan Avenue, Chicago.

MEDICAL NEWS

October Meeting of New York Physical Therapy Society

The New York Physical Therapy Society stated meeting was held on Friday, October 3, 1941, at 8:30 P. M. at the Phi Gamma Delta Club, 106 West 56th Street, New York, N. Y. It was a closed session for members and their guests. The paper of the evening was introduced by Dr. *A. Bern Hirsh*. It dealt with the problem of "A New Technic for Reduction of Dislocated Vertebrae," with anatomical and clinical demonstration, presented (by invitation) by *Henry P. de Forest*, M.D. Discussions were opened by *George A. Harlow*, M.D. (by invitation), of Winter Park, Florida.

The second part of the program was limited to an executive session, following which there was presented a report on the activities at the American Congress of Physical Therapy at Washington, D. C.

Lewis J. Silvers, M.D.,
President,
64 East 87th St., New York, N. Y.
Madge C. L. McGuinness, M.D.,
Secretary,
1211 Madison Ave., New York, N. Y.

Dr. McClellan Addresses Fifth District Branch of the Medical Society of the State of New York

Dr. Walter S. McClellan of Saratoga Springs, New York, spoke on "Facilities, Personnel and Waters as Presented for Treatment at the Saratoga Spa," at Syracuse, September 23, at the meeting of the Fifth District Branch of the Medical Society of the State of New York.

Dr. McClellan who is Acting Chairman of the Committee on American Health Resorts of the American Medical Association, will also read a paper on "Spa Therapy for the Convalescent Patient," at the meeting of the American Clinical and Climatological Association, Skytop, Pa., October 16-18, 1941.

Dr. Hektoen Honored

Dr. Ludvig Hektoen, executive director of the National Advisory Cancer Council, received a citation from the State Medical Society of Wisconsin during its annual session, September 10, which was the society's centennial award for distinguished service. Dr. Hektoen is professor emeritus of pathology of Rush Medical College and the University of Chicago. He was director of the John McCormick Institute for Infectious Diseases from 1902 to 1940.

Meeting of the Pennsylvania Physical Therapy Society of the American Congress of Physical Therapy

Physicians and medical students are invited to the Pennsylvania Physical Therapy Society meeting to be held October 30, 1941, at 9 P. M., at the Philadelphia County Medical Society Building, 21st and Spruce Streets, Philadelphia. The order of the program is as follows:

(1) Election of Officers.
(2) Arrangement of Program.
(3) Facts Concerning the Practice of Physical Medicine (Round Table Conference). Drs. *William H. Schmidt, Frank L. Follweiler, Oscar T. Wood, Jr., Maurice Weisblum, William T. Johnson, Benjamin Ulanski, J. H. Hennemuth, Leonard D. Frescoln, Earl W. Rothermel*, and *Harold Lefkoe* will participate.

Albert A. Martucci, M.D., *Secretary*,
5015 Akron Street, Philadelphia.

Physical Therapy in Florida

Physical Therapy is beginning to take on a definite form in Florida. Departments have been opened up in Jacksonville under the supervision of Dr. John B. Black; Pensacola, under the supervision of Dr. John J. McGuire (Chairman of the Southeastern Section of the Congress); Tampa, under Dr. E. F. Carter; St. Petersburg, under Dr. Annette Bieker Feaster and the Miami Physical Therapy Centre under the direction of Dr. Kenneth Phillips at Miami. This progress is a good showing since the Southeastern Section is only three years old.

Meeting of Section on Physical Therapy, Medical Society of County of Kings

The next regular meeting of the Section on Physical Therapy of the Medical Society of the County of Kings will be held in the Medical Society Building, 1313 Bedford Avenue, Brooklyn, N. Y., on Thursday, October 9, 1941, at 8:30 p. m. sharp. The program will be as follows:

1. Short Wave Diathermy in Non-Union of Fractures, *B. S. Miller*, M.D., Assistant, Physical Therapy, Kings County Hospital.
2. Pertinent Points in Peripheral Vascular Diseases, *I. Muss*, M.D., Assistant, Physical Therapy, Kings County Hospital.
3. Cold Quartz, *J. Schepps*, M.D., Associate, Physical Therapy, Kings County Hospital.
4. Physical Therapy in War Injuries, *S. Tovitz*, Assistant, Physical Therapy, Kings County Hospital.
5. Electrical Testing, *Lewis Dickar*, M.D., Assistant, Physical Therapy, Kings County Hospital.

The medical profession is cordially invited.

(*Concluded on page 622*)

ARCHIVES of PHYSICAL THERAPY

OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL THERAPY

.·. EDITORIALS .·.

PHYSICAL THERAPY IN EDUCATION AND RESEARCH

In the present issue appears an inspiring article by Dr. William T. Sanger, President of the Medical College of Virginia, on the subject of education and research in physical therapy.

To anyone who is concerned primarily with physical therapy, it is gratifying to know that a man whose major interest is medical education has such a keen insight concerning the needs in our field. It is a source of great encouragement to physicians who are specializing in physical medicine to find that a distinguished medical executive is proposing the establishment of a truly outstanding educational and research program in this subject. To quote from Dr. Sanger's splendid paper,[3] it is becoming apparent that there is "the need of establishing in some medical center with undergraduate medical students an institute of physical therapy of such proportions and quality as to make a convincing demonstration in this field, so adequate and challenging that its influence will be felt even abroad."

In this connection, it seems advisable to refer once more to the statement of Alan Gregg, Director of Medical Sciences in the Rockefeller Foundation. In reply to his own hypothetical question:[1] "Where could some funds be applied, almost for the first time, to make a distinctive, single and lasting contribution to medical education in North America?" he answered: "A curious phenomenon in American medicine is the deft elimination of much reference to physical therapy. Almost as those who keep their children ignorant of the facts of life, we appear to protect the American medical student from the knowledge of physical therapy, mindful, I suppose, of the abuses imputed to osteopaths and chiropractors. Of course, there is much the same result: thus protected, our graduates angrily complain of competition from those whose knowledge it is tabu to acquire. Cornford comments on propaganda as the art of lying in such a way that you very nearly deceive your friends without quite deceiving your enemies. That reminds me of the way physical therapy is propagated in this country. But the effects of heat on capillary circulation, lymph flow and inflammation, and the indications and effects of massage and passive movement or of irradiation, can certainly be learned and taught as physiology without any trace of charlatanry. The current unabashed ignorance of physical therapy in this country leaves it as an excellent opportunity for development in American medicine."

In a new book[2] which has just been published, Dr. Gregg has discussed succinctly medical research, the role of universities and foundations in relation to such research and also he described the medical research worker. He said: "To understand the phrase 'medical research' we need not spend much time

on the meaning of the word 'medical': the important word to understand is '*research.*' The word 'research' has a flavor of dissatisfaction with the search made hitherto, or with the hitherto accepted explanations. It more than suggests a desire to go back of the extant bases for knowing something. It wants to re-examine the evidence, and that often leads to refining the methods by which the evidence was secured. Thus research involves betimes a critical examination of our sources and ways of learning what we describe as facts."

In the field of physical medicine it is particularly evident that there is need for further critical examination of "our sources and ways of learning." It is important at this time that more study of the fundamentals be undertaken. Therefore, an outstanding institute of physical medicine should be provided with ample facilities for research.

Education in physical therapy has been limited greatly because of the slowness with which courses on the subject have been introduced into our medical schools. For this reason, a great institute of physical medicine should take as its second aim the advancement of education among undergraduate medical students, among medical graduates and their technicians and the laity. Finally, the third objective of such an institute should be to provide adequate clinical facilities for furtherance of all phases of clinical practice of physical medicine, pushing forward into new fields of clinical practice and re-examining older procedures.

With leaders of medical education, such as Dr. Sanger and Dr. Gregg, interesting themselves in this subject, the prediction can be ventured that there soon will be such an institute at some great medical center. As Dr. Sanger has pointed out, "such an undertaking would require large financial resources," but it is not too much to hope that some philanthropist of great vision will realize this need and make such a program possible. If such an institute is founded, it is hoped that it will be able to effect a complete change in the attitude of the medical schools toward education in this important branch of medicine.

Hans Zinsser[4] has emphasized the power of such foundations or institutes. He said it could be concluded that "the indirect power of foundations to stimulate fundamental changes in an educational system is a great one, and that the decisions and opinions of self-perpetuating boards of foundations may determine policies in the most important department of civilized society — namely, its educational system."

The optimist among physicians specializing in physical medicine can well believe that the time is not far distant when a great institute of physical medicine will rise at some American medical center; and that when it does, stupendous strides will be made in advancing education and research in physical medicine.

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2. ————: The Furtherance of Medical Research, New Haven, Yale University Press, 1941, p. 129.

3. Sanger, W. T.: Physical Therapy in Education and Research, Arch. Phys. Therapy **22**:581 (Oct.) 1941.

4. Zinsser, Hans: The Next Twenty Years, Science **74**:397 (Oct. 23) 1931.

PHYSICAL THERAPY AND THE PRESENT NATIONAL EMERGENCY

The national emergency is uppermost in the minds of all at this particular time. Naturally, every physician who is interested in physical medicine is wondering what part he can play in solving our collective problems. During the World War of 1914-1918, physical therapy came into its own. The old adage, "It is an ill wind which blows no one good," may well be thought of in considering the status of physical therapy in the present emergency.

There is every indication that with the development of the very excellent new Army hospitals fine departments of physical therapy will be included. New specialists in physical therapy will be trained, additional technicians will be taught and a fresh group of workers will be added to our rather thin ranks of investigators. Thus, added impetus should be given to the efforts of all concerned.

All of us should be pleased to realize that large numbers of additional workers will be joining us. No specialty in medicine can hope to develop rapidly unless a large number of physicians are interested in the advancement of that specialty.

With these thoughts in mind, every physician who is interested in the subject of physical therapy should do everything in his power to promote the growth of the work in physical therapy in the military hospitals. More power to all of us in such endeavors!

THE 1941 YEAR BOOK OF PHYSICAL THERAPY

For the past four years one of the most active members of the American Congress of Physical Therapy has been editing the "Year Book of Physical Therapy." The latest edition, just off the press, is a worthy successor to the previous volumes.

This series of books is accomplishing wonders in spreading information concerning physical therapy to the ranks of medical practitioners in all parts of the country.

The Year Book cannot hope to succeed unless it receives adequate support. Every subscriber to the ARCHIVES would do well to obtain one of these extremely instructive and up-to-date reviews of the present literature in our field.

Physicians interested in physical therapy will benefit themselves, as well as their cause, by supporting this effort.

Medical News

(Continued from page 618)

R. A. Winters, M.D.
Itinerant Principal of Unsponsored Postgraduate Course

The Bureau of Investigation of the American Medical Association first encountered the name of Dr. R. A. Winters in the advertising of "Diatone." The advertisement was a reprint of an article by Winters from the January, 1936, issue of the *American Journal of Physical Therapy*. In this article he stated in part:

"I have successfully used for some time, colloidal uranium (Diatone) . . . In thirty cases treated recently, three had been receiving insulin injections which were gradually withdrawn. Twenty-nine of the thirty showed a marked recovery, with a definite control of the symptoms. . . . one case that did not respond . . . showed a four plus Wassermann . . ."

In this article he also suggested "medications, colonic flushings or other therapeutic aids as indicated" and added "Short Wave Radiations through the pancreas have been known to aid in a more rapid stimulation of its tissues. Deep massage to the abdomen is a very helpful aid."

In February, 1937, the Food and Drug Administration issued a Notice of Judgment against Diatone, because it was fraudulently represented as a remedy for diabetes. A month later—in March, 1937—it was reported that Diatone, Inc., had gone out of business, having filed a Notice of Dissolution.

Prior to this—in November, 1936—the *Bulletin of the Erie County Medical Society*, Buffalo, published a statement under the title "Young Doc Winters Arrives, Lectures and Departs." This note indicated that he lectured in Buffalo, November 9 and 10, on "Needle Surgery." It referred also to his apparent connection with the Farnsworth Laboratories and mentioned that concern's product "Alphacatalyst." The Bureau published a report on this treatment in *The Journal* for May 6, 1933, which concluded in part as follows:

"In spite of the fact that the Alphacatalyst (Oxycatalyst) has been on the market six years, there is still no scientific evidence to indicate that it has any value."

A previous article appeared on this preparation in *The Journal* for May 19, 1928.

The Buffalo item also referred to the fact that Winters was reported to be dean of the American College of Physical Therapy, which organization was exposed in *The Journal* for Sept. 23, 1933, at a time which was apparently prior to Winters' connection with it. The conclusion of this article read in part as follows: "Of course, the 'college' has not been approved by the Council on Medical Education and Hospitals of the American Medical Association. . . . It is to be hoped that institutions such as the American College of Physical Therapy are but a passing phase. . . ."

As far as this Bureau can determine, it was in 1937 that Winters started using the postcard announcements of his courses. They are frequently given at the Hotel Morrison in Chicago and in other cities scattered through the United States—Cincinnati, Pittsburgh, Philidalphia, St. Louis, Kansas City, Des Moines, New York, Denver, Omaha. He frequently makes return visits. For example, in 1939, he gave a course in Columbus, Ohio, on April 16 and 17 and in Cleveland, April 18 and 19, and in 1941 he gave courses in Columbus on June 15 and 16 and in Cleveland on the 17th and 18th.

The card which he forwards announces a "Condensed Postgraduate Course," which is described as a "practice class in ambulant therapy." It is stated on the cards that "Dr. Winters needs no introduction to the profession—his work is nationally recognized, and he has conducted many similar courses." The card goes on to announce the treatment of hernia by injection, discusses everything from low back pain to sinus disease and impotence and describes the tuition as $10 for four sessions.

Shortly after the receipt of these cards in any locality, numerous inquiries are made of the Bureau of Investigation concerning the qualifications of Winters. The inquirers are informed that Winters was born in 1901 and graduated from Loyola University School of Medicine, Chicago, in 1928, that he is not a member of the Chicago Medical Society or a fellow of the American Medical Association and that no information is available to show that he has had special training in any field of surgery.

Only rarely today does one encounter the itinerant physician who goes about from city to city, maintaining temporary offices in hotels. Frequently pseudomedical lecture courses are given to laymen by faddists and others. Winters, however, is a Doctor of Medicine who is licensed to practice in Illinois and advertises his courses exclusively, so far as the Bureau has been able to determine, to physicians. No information is available concerning the exact nature of the courses given. It is not customary—to put it mildly—for reputable physicians to engage in such activities. Time and time again the information on Winters has been forwarded at once from this Bureau but received only after he has left for other cities. An example of this occurred in 1938, when information concerning him was forwarded to the *New England Journal of Medicine* and printed in its December 1 issue with the following notation: "The above letter was received too late for publication in the November 24 issue of *The Journal*. Dr. Winters' postgraduate course has been given; we wonder how many New England physicians were gullible enough to attend."

The time has long since passed when there could be any reason for a lecturer to visit physicians and surgeons in their own localities in order to inform them of new technics, even if it was done in an ethical manner. The attendance at such meetings as those of the American Medical Association, the Amerian College of Surgeons, the American College of Physicians and the various specialty societies and, more particularly, at various ethically conducted postgraduate courses in institutions approved for giving such courses indicates clearly that, busy as he is, the physician who realizes the need of additional training does not find it difficult to obtain this training.

Editor's Note. — Because the American Congress of Physical Therapy prior to 1930 was known as the American College of Physical Therapy, we believe the foregoing item taken from the *Journal of the American Medical Association*, October 4, 1941, should be of interest.

Dr. Dark's Wife Writes a Best Seller

Eleanor Dark, the wife of Dr. Eric Dark, has just published (Macmillan) an interesting and important novel. Physical therapy physicians in the United States know Dr. Eric Payten Dark, M.C., M.B., Ch.M. (Syd.), from his book, "Diathermy in General Practice," Sydney, Australia, Angus & Robertson, 1934 (2nd Edition). Their home is in Katoomba, New South Wales.

"The Timeless Land," is a richly colorful story of the first five years of English settlement in Australia, and of the black people whose life and culture and natural gaiety were so cruelly destroyed in that short time. The story is a dramatic one, eloquently told.

The few boatloads of convicts who landed in Sydney Harbor in 1788 make poor pioneer stock indeed. That they survive at all is due to the courage and wisdom of their Captain Phillip. His story is told here, as is that of a fictional character, Andrew Prentice, a red-headed convict who escapes, takes a native wife, and flourishes with her in the wilds while his fellow English back at the settlement are near starvation.

Parallel to the slow establishment of the white colony runs the sad history of the black men's demoralization, personified in Bennilong, an historical figure and a leader in his tribe, who develops a fatal friendliness toward the English. A visit to London completes his undoing, and symbolizes the coming degeneracy of his whole race.

New Army Medical Library and Museum

The Congress of the United States has just completed legislative action on a bill authorizing the War Department to purchase for $1,000,000 a site near the Folger Shakespearean Library for a new Army Medical Library and Museum to cost $3,750,000. Even approximate estimates calculate that the material now available in the Army Medical Library and Museum is worth at least $25,000,000 and could not possibly be replaced even at that price. It is hoped that the planning and construction of the new building will not be delayed a moment longer than is necessary, even by the intensity of the preparedness program. It is hoped that if any question of priorities arises in relation to the construction of this project, the office concerned with that problem will do well to get action as quickly as possible. The invaluable material in the Army Medical Library is the very basis of much of the scientific work absolutely necessary to military efficiency.

Locations and Owners of Respirators

The National Foundation for Infantile Paralysis, Inc., has released publication Number 24A, entitled, "Respirators, Location and Owners," as of July 1, 1941. Mr. Basil O'Connor, President of the Foundation, announces in the foreword that this is a list of adult cabinet type respirators or "Iron Lungs," compiled from records available July 1, 1941. It contains only those respirators which have been approved by the Council on Physical Therapy of the American Medical Association. The National Foundation hopes that the list will prove helpful in any emergency and in epidemics of infantile paralysis. The Foundation is prepared to render any assistance that it can in regard to respirator problems.

Heat Treatment Generators

Dr. Eugene Mittelmann, consulting engineer, and on the staff of the Physical Therapy Department of Northwestern University Medical School, Chicago, has an interesting article in "Electronics," September, 1941, on "Design Chart for R-F Heat Treatment Generators." He states that the principal difficulty in the design of generators using the condenser field method for radio frequency heat treatment is due to the characteristic potential distribution in the output circuit of such generators. The actual radio frequency potential across the object itself is a small fraction of the total high frequency voltage across the electrodes. The potential distribution is a rather complicated function of a great number of variables including the wavelength, the capacity between the electrodes and the object (which in turn is a function of the size of the electrodes, their distance from the object and the dielectric constant of the space between the electrodes), and the conductivity and dielectric constant of the object itself.

In general, both in the industrial and in the electromedical fields of application, the load impedance represented by the object is small compared to the reactances of the coupling capacities between object and electrodes. Hence the necessity for an excessively high frequency voltage across the electrodes for the achievement of a certain required power absorption by the object.

In the article a design chart is given which gives the high frequency voltage across the electrodes as a function of the distance between object and electrodes for any arbitrary values of the various parameters. The chart may be used to determine the power absorbed in the load when the area of the electrodes and the load impedance are known or any one of the other variables.

Children's Bureau News

Several important changes in the staff of the United States Children's Bureau during recent months have been announced by its Chief, Katharine F. Lenroot.

Martha M. Eliot, M.D., Assistant Chief of the Bureau since 1934, became Associate Chief in May, 1941. She continues to collaborate with the Chief in developing and carrying out policies governing the entire field of the Bureau's work and to have special responsibility for the health work of the Bureau.

Charles I. Schottland was appointed in May as Assistant to the Chief of the Bureau. Mr. Schottland is a graduate of the University of California at Los Angeles, has had postgraduate training in social work and law, and is a member of the bar of the State of California.

The Maternal and Child Health Division and the Crippled Children's Division have been combined as the Division of Health Services, with Edwin F.

Daily, M.D., formerly Director of the Maternal and Child Health Division, as Director of the new division. Hart E. Van Riper, M.D., formerly Assistant Director of the Maternal and Child Health Division, is Assistant Director for Maternal and Child Health; and A. L. Van Horn, M.D., formerly Assistant Director of the Crippled Children's Division, is Assistant Director for Crippled Children.

Dr. Robert C. Hood, formerly Director of the Crippled Children's Division, resigned from the Children's Bureau in June and is now Director of the Maternal and Child Health Division, Florida State Board of Health.

Jacob Yerushalmy, Ph.D., was appointed in January as Director of the Division of Statistical Research. Dr. Yerushalmy received his doctor's degree at Johns Hopkins University in 1930. He has conducted research with the National Research Council at the University of Illinois and at Princeton University and has been instructor in mathematics at Johns Hopkins University, statistician in the New York State Department of Health, and statistician in the Division of Public Health Methods of the National Institute of Health, United States Public Health Service.

Katharine Bain, M.D., was appointed in September, 1940, as Director of the Division of Research in Child Development. Dr. Bain has been instructor in clinical pediatrics at Washington University School of Medicine in St. Louis, Mo., and has done research work in the field of allergy, particularly in relation to infant feeding. Dr. Bain is in charge of health studies of the Bureau. — (*The Child* **6**: 49 [Aug.] 1941.)

Alleged Negligent Application of Heat in Treatment of Phlebitis

Soon after being confined to bed for fifteen days following an appendectomy, the plaintiff suffered severe pain in the lower part of his left leg. The defendant physician, who was then called in on the case, made a diagnosis of phlebitis and advised the application of heat to the affected area. In accordance with his instructions a cradle made from barrel staves sawed in half to which two 40 and one 50 watt electric light bulbs were attached was placed over the injured leg and covered with a blanket to retain the heat of the lighted bulbs, which were 6 or 7 inches distant from the leg. An ice pack was placed on the groin, the foot was elevated and the patient was kept quiet. Before the cradle was constructed, the physician left the patient and did not see him again until the following day. Meanwhile, the heat was continuously applied. On the physician's return, he discovered a water blister of considerable size which had formed on the leg between the ankle and the thigh. Because of his discomfort, the patient asked that the cradle be removed. The physician refused to permit this, informing the patient that the cradle was necessary for proper treatment of the condition and that the water could not be drained from the blister. As the physician directed, the lights as originally installed remained burning in the cradle continuously for about three days, when three bulbs of 15 watts each were substituted. The cradle was then used for an additional eighteen days and removed. After the removal of the cradle the blister burst, and subsequently ulcers formed in the affected area of the leg. Later the patient sued the physician for malpractice, claiming that he had been negligent in "the manner of applying the treatment."

At the trial it appeared from the testimony of medical experts that phlebitis is a condition not infrequently resulting from operations and that in spite of the care taken by the operating physician it is unpredictable and unpreventable. As the court viewed the evidence, phlebitis occurs when a blood vessel has become obstructed or "occluded by virtue of a clot known as a thrombus," and the condition is indicated by swelling in affected areas, pain and ofttimes discoloration. Phlebitis sometimes causes blisters on the surface of the skin without the application of heat, sores and ulcers developing quite commonly. In the opinion of the medical witnesses, the disability of the patient at the time of the trial was traceable mainly to the thrombus, the scarification that was present was a "cosmetic factor more than anything else" and, although not usually the case, phlebitis would cause not only blisters but destruction of the tissue "to the point of gangrene" without any application of heat. According to those witnesses, applications are frequently given by a homemade contrivance, without thermometer or means of adjustment, such as the one used by the physician in this case. In response to a question asked one of the expert witnesses called by the patient as to whether or not in his treatment of such a condition following an abdominal operation he had ever advised an electric cradle and left the installation of it to the patient, or to laymen, he stated that he had done so frequently and that it was customary to advise the use of a device such as was employed by the physician in this case and to leave it to a layman to follow the instructions given. At the close of the evidence, the trial court directed a verdict in favor of the physician and the patient appealed to the Supreme Court of Florida, division A.

The Supreme Court was unable to find any evidence in the record that would have justified a verdict for the patient. The fact, said the Supreme Court, that a blister did result while treatment was being given and that ulcers later appeared on the diseased leg did not of themselves establish negligence on the part of the physician, since the doctrine of res ipsa loquitur has no application under the facts here present. The evidence introduced by the patient falls far short of proving negligence on the part of the physician. While it is evident that the patient suffered intensely as a result of the remedy used in treating his illness, the fact remains that his leg which was so badly affected was saved. There was no testimony that his physical condition after his ordeal was traceable to aught but the severe phlebitis which followed the operation. Even by the testimony of witnesses called by the patient, it was established, in our opinion, that in this case the proper remedy was used properly. Since we believe that the patient failed in his attempt to fix on the defendant physician the responsibility for the injury he endured, we find no error in the action of

the trial court in instructing a verdict for the physician. The judgment in favor of the physician was accordingly affirmed.—Grubbs v. McShane, 198 So. 208 (Fla., 1940). J. A. M. A. 117:64 (July 5) 1941.

Tuskegee Institute Infantile Paralysis Center

Made possible by a grant of $172,256 to Tuskegee Institute by the National Foundation for Infantile Paralysis, the Tuskegee Institute Infantile Paralysis Center was dedicated January 15, 1941. It provides special facilities for the care of Negro sufferers from the after-effects of infantile paralysis. John W. Chenault, M.D., is Director of Orthopedic Surgery of the Center. Tuskegee Institute is only forty miles from Montgomery, the Capital City of the State of Alabama, and is easily accessible from all important points in the southern region by rail, highway and air. The Tuskegee Institute Infantile Paralysis Center consists of a modern three story, fireproof building, well equipped with the latest facilities for the care of crippled persons. The basement floor includes a gymnasium, equipment for massage, whirlpool arm and leg baths and electrotherapeutic machines of the latest type. A separate room contains a stainless steel Hubbard Treatment Tank especially for the treatment of small children. A special feature of this department is the green-tiled treatment pool twenty-five by thirty feet in which patients of all ages and sizes may be treated. The first floor includes a sound-proofed lobby, a business office, office and treatment room for the Chief Surgeon, a tiled plaster room, laboratory facilities, a brace fitting room and a small children's ward which has been acoustically treated. From this ward a spacious sun deck overlooks a paved exercise court where patients may receive instruction and care. The third floor is entirely a patient floor of two five-bed wards, two four-bed wards and two two-bed wards, well lighted and ventilated. The environment of Tuskegee Institute, with its educational and recreational opportunities, in addition to the scientific medical services of the new Center, assures patients ideal conditions for mental and physical convalescence.

Announcement
Physical Therapy Technicians (Aides)

At the request of the Surgeon General of the Army, and as an expansion of its peace time service for the military forces, the American Red Cross has undertaken the enrollment of medical technologists who are willing to serve in the Medical Department of the Army or Navy if and when their services are required in a national emergency. Included in this enrollment will be physical therapy technicians (aides), men and women, who can meet certain technical and physical standards.

With the cooperation of the various registries and associations of medical technologists all members are being asked to enroll with the Red Cross for this possible service with the military forces. If and when the services of those enrolled with the Red Cross are required, physical therapy technicians (aides) who qualify may be utilized by the Army or Navy according to the following plan:

For the Army—

Men who meet the required standards will be enlisted and assigned to the Medical Department. Under existing regulations (or requirements or statutes) all Selectees and Enlistees are put (or placed) in the grade of Private and undergo a period of basic military training. Subsequently technologists (or men) are assigned to units and may be subject to promotion to non-commissioned grades or to specialist ratings commensurate with the duties performed and the ability of the individual to accept responsibility and within the vacancies in grades and ratings available under funds allotted. Men who enroll and pass the necessary physical examination but who may later be found physically unqualified for military duty if and when their services are required by the Army, may be employed as civilians.

Women who meet the required standards may be employed as civilians.

For the Navy—

1. Men only. If and when the services of male physical therapy technicians (aides) are desired by the Navy, they will be enlisted in the Naval Reserve as Pharmacist's Mates, 1st, 2nd, or 3rd class, or Chief Pharmacist's Mate (acting appointment) to be determined by the District Commandant on the basis of the individual's qualifications.

2. Notwithstanding the maintenance of this enrollment for a possible national emergency, the Navy also desires peacetime enlistment in the U. S. Naval Reserve; and male physical therapy technicians (aides) who wish to enlist therein should communicate with the nearest Naval Recruiting Station.

General qualifications for enrollment are as follows:

1. Citizens of the United States.
2. Ages 21-45 years (Army); 18-50 (Navy).
3. Physically qualified. Applicants must pass a satisfactory physical examination before enrollment. It should be understood that all applicants who are accepted for enrollment will be required to pass another physical examination given by the Army or Navy at the time their services are utilized.
4. Each applicant must express a willingness to serve as a technologist in the event of a national emergency.

Special and technical requirements for physical therapy technicians (aides) follow:

Physical Therapy Technicians (Aides)—

Requirements for registration:

1. Men or women.
2. Education and experience:

a. Graduation from an accredited high school or its equivalent.

b. (1) Graduation from a course of Physical Therapy of not less than nine months duration, from a school approved by the Council of Medical Education and Hospitals of the American Medical Association following:

(a) Graduation from a four-year course in Physical Education, or a four-year college or university course with a major in Physical Education, *or*

(b) Graduation from a school of nursing recognized by law in the individual states, *or*

(c) Sixty college semester hours, including courses in physics, chemistry and biology, *or*

(2) Equivalent education prior to 1936, which is the date of the publication of the list of courses approved by the Council of Medical Education and Hospitals.

One year's practice in Physical Therapy within two years of graduation from the school of Physical Therapy.

3. Favorable letters of recommendation from the director of the institution in which practice was accomplished.

Army,—

Men who qualify physically, for military status, see the foregoing paragraph "For the Army."

Women who qualify physically—civilian employee—($1800 a year, less deduction of $390 for quarters and rations).

Navy—

Men only, who qualify physically, as Pharmacist's Mates, 1st, 2nd, or 3rd class or Chief Pharmacist's Mate (acting appointment) in the Naval Reserve, to be determined by the District Commandant.

Aerobiology

The University of Chicago on the program of the fiftieth anniversary symposia, September 22 to 27, 1941, presented in cooperation with the American Association for the Advancement of Science and the Committee on Aerobiology of the National Research Council a number of papers on aerobiology. Among these were:

Air-borne Infection as a Basis for a Theory of Contagion, *William F. Wells*, Associate Professor of Sanitary Engineering, and *Mildred W. Wells*, Associate, University of Pennsylvania.

The Behavior of Microscopic Particles in the Air and in the Respiratory System, *Theodore F. Hatch*, Associate Professor of Industrial Hygiene, University of Pennsylvania.

The Atomizing of Mouth and Nose Secretions into the Air as Revealed by High-speed Photography, *Marshall Walker Jennison*, Associate Professor of Bacteriology and Sanitary Biology, Massachusetts Institute of Technology.

Disinfection of Air by Air-conditioning Processes, *Constantin P. Yaglou*, Associate Professor of Industrial Hygiene, Harvard School of Public Health, and *Ursula Wilson*, Infants' Hospital, Boston.

The State of Suspension of Bacteria in the Air as Measured by Settling Rates, *Earle B. Phelps*, Professor of Sanitary Science, Columbia University.

Under the subject of the germicidal action of ultraviolet light the following papers were presented:

Standardization of Ultraviolet Lamps Used as Sources of Germicidal Radiation, *William W. Coblentz*, Physicist, National Bureau of Standards.

The Physiological Effects of Ultraviolet Radiation, *Henry Laurens*, Professor of Physiology, Tulane University.

Abiotic and Sublethal Effects of Ultraviolet Radiation, *Alexander Hollaender*, Senior Biophysicist, National Institute of Health.

Production and Control of Bactericidal Ultraviolet Radiation, *Harvey C. Rentschler*, Westinghouse Electric and Manufacturing Company.

Characteristics of Some Low Voltage Type Germicidal Lamps, *Leroy J. Buttolph*, General Electric Company.

Practical Considerations in Design and Maintenance of Ultraviolet Air Sanitation Equipment, *Frederick W. Robinson*, Hanovia Chemical and Manufacturing Company.

Characteristics of Sperti Electric Manufacturing Company Ultraviolet Lamps, *John Kruetzkamp*, Sperti Manufacturing Company.

The Importance of Air-borne Pathogenic Bacteria in the Operating Room: A Method of Control by Sterilization of the Air with Ultraviolet Radiation, *Deryl Hart*, Professor of Surgery, Duke University.

The Growth-promoting Role of Ultraviolet in Wound Healing, *Leo G. Nutini*, Laboratories of the Institutum Divi Thomae.

Some Clinical and Laboratory Observations on Wound Healing Under Ultraviolet Radiation, *Cornelius Kroissl*, *David Wilson*, and *Frank L. McEneny*, Columbia University.

In a consideration of ultraviolet irradiation in the control of respiratory contagion, the following were presented:

The Environmental Control of Epidemic School Contagion, *William F. Wells*, Associate Professor of Sanitary Engineering, *Mildred W. Wells*, Associate, and *T. W. Wilder*, University of Pennsylvania.

The Dissemination of Pathogens in Hospital Wards and in Families as Revealed by Studies on Carriers and by Secondary Cross Infections, *Maxwell Finland*, Boston City Hospital, Boston.

On the Control of Cross-infections in a Children's Hospital, *Elizabeth C. Robertson* and *M. Elizabeth Doyle*, Toronto.

Experience in the Children's Hospital, Boston, *Kenneth Blackfan*, Professor of Pediatrics, Harvard University, *Glidden L. Brooks*, and *Ursula Wilson*, Boston.

The Problem of Cross-infection and Its Control in Infants and Children: Experience in the Willard Parker Hospital, New York, *D. M. Tolle*, New York.

Effect of Irradiation of the Air in a Ward on the Incidence of Infections of the Respiratory Tract with a Note on Varicella, *Louis H. Barenberg*, *David Greene*, *Leon Greenspan*, and *Bernard Greenberg*, The Home for Hebrew Infants, New York.

Respiratory Contagion in the House of the Good Samaritan, Boston, *Duckett Jones* and *Stafford M. Wheeler*, Boston.

Observations on the Control of Respiratory Contagion in The Cradle, *Ivan Rosenstern*, Evanston, Illinois.

The Controlled Physical Environment for the Premature Infant, *Charles Chapple*, Children's Hospital, Philadelphia.

The Control of Cross-infection through the Use of Mechanical Barriers and Air Conditioning, *James A. Reyniers*, Associate Professor of Biology, University of Notre Dame.

The Bactericidal Effects of Daylight and Sunlight on Chained Gram Positive Cocci in Simulated Room Environment: Theoretical and Practical Considerations, *Leon Buchbinder*, Research Associate in Sanitary Science, Columbia University.

Sterilization of Air by Means of Germicidal Aerosol-Mists and Vapors, *Oswald Hope Robertson*, Professor of Medicine, *Edward Bigg*, *Benjamin F. Miller*, *Theodore T. Puck*, and *Zelma Baker*, The University of Chicago.

Recent Experiences in England, with Special Reference to the Importance of Dust, *M. van den Ende* and *C. H. Andrewes*, National Institute of Medical Research, London.

Experimental Air-borne Infection of Animals, *William F. Wells*, Associate Professor of Sanitary Engineering, *Mildred W. Wells*, Associate, *Stuart Mudd*, Professor of Bacteriology, *Max B. Lurie*, and *Werner Henle*, University of Pennsylvania.

South American Congress of Sports Physicians

The second South American Congress of Sports Physicians was recently held in Buenos Aires. The subjects treated were sports for women from the medical point of view, the effect of geographic altitude on sports efforts and the evaluation of cardiopulmonary effort in sports activities. Medical discussion included long distance running, therapies pertaining to sports activities and the relation of nutrition to sports. The resolutions adopted at the close included the continued study of the effect of altitudes on sports exertions, especially of the time required to condition the individual for altitude sports and of the limits of physical exertion from the point of view of individual health. Sports contestants should be given roentgenologic and tuberculin examinations. The next congress will meet in 1943 in Montevideo, Uruguay.

Arthur Roosevelt Bowles 1906-1941

It is with extreme regret we announce the untimely death of Dr. Bowles. Since October, 1939, Dr. Bowles was hospital inspector on the staff of the Council on Medical Education and Hospitals of the American Medical Association. In this capacity Dr. Bowles also inspected schools approved for physical therapy technicians. His arduous efforts which have since been taken over by Dr. M. G. Westmoreland served to carry on the work of standardizing the curricula for these schools. In cooperation with the Council on Physical Therapy much active work was initiated along these lines. Around the conference table and at all other times Dr. Bowles offered his assistance which will indeed be missed by all those who came to him for help and advice. The members of the American Congress of Physical Therapy and the Board of the American Registry of Physical Therapy Technicians extend their condolence to his bereaved family.

Periarthritis of the Shoulder — Solomon, et al.

(*Continued from page 610*)

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NOTE: Discussions will appear in a later issue. — ED.

BOOK REVIEWS

THE 1941 YEAR BOOK OF PHYSICAL THERAPY. Edited by *Richard Kovács*, M.D., Professor and Director of Physical Therapy, New York Polyclinic Medical School and Hospital. Ed. 4. Cloth. Pp. 430. Price, $3.00. Chicago: Year Book Publishers, 1941.

As in former volumes, the author presents a digest of the important literature of the past year both English and foreign. One-half of the volume deals with the various physical methods and includes the latest reports on the newer modalities, such as crymotherapy, ultra sound waves, air conditioning and many others, whereas the second half covers the practical application of physical measures in a comprehensive manner. Illustrations are numerous, and specific details of technic are often included. The presentation of the reviews is clear, concise and authoritative. The comments of the editor following many of the reviews are priceless, displaying the wisdom, vast clinical experience and scientific acumen of Dr. Kovács. The publication of a book of this nature is not only a great convenience but a service to each person interested in physical medicine, and editing by such an outstanding authority makes it indispensable. Not only physicians specializing in this field but every physician who practices medicine would profit by reading this book. Every branch of medicine today uses physical methods, and this 1941 volume supplies a critical and thorough review of the latest developments which cannot be found elsewhere.

ELECTROCARDIOGRAPHY. By *Louis N. Katz*, A.B., M.D. Director of Cardiovascular Research, Michael Reese Hospital, Chicago; Assistant Professor of Physiology, University of Chicago. Pp. 580. Cloth. Price $10.00. Philadelphia: Lea & Febiger, 1941.

This book is one of the latest and best treatises on this subject. It is divided into three sections; the first deals with the theory of electrocardiography considering the special anatomy and physiology of the heart and its relation to the electrocardiogram. A clear and concise presentation of the physical principles of the electrocardiograph is included in this section. The second section presents a systematic description of the electrocardiographic contours in health and disease. A complete description of observations in coronary heart disease illustrated with numerous tracings makes this section of unusual value. The two chest leads are included in the discussion and illustrations and their importance is evaluated. The third section describes the arrhythmias. An extensive and current bibliography follows each section. The text is free of many references and controversial discussions. Many illustrations, both line drawings and electrocardiograms are included and sufficient description accompanies each illustration so that they can be used independent of the text. This volume is written to make it possible for any physician to interpret properly an electrocardiogram. Today this diagnostic procedure is no longer "a plaything for the erudite" as expressed by the author but "a precise tool, an objective recorder of events."

EXERCISES IN ELECTROCARDIOGRAPHIC INTERPRETATION. By *Louis N. Katz*, A.B., M.D. Pp. 222. Cloth. Price, $5.00. Philadelphia: Lea & Febiger, 1941.

This is the companion volume to Electrocardiography by the same author. While it supplements the other book it may be used independently. The author's purpose, we believe, is to test the reader's ability to interpret an unknown electrocardiogram. A tracing is shown on one page while on the opposite page there is a short clinical history, a detailed interpretation and a description of the record and the correlation of the observations. Ninety case reports are recorded; both normal and abnormal electrocardiograms are printed. The case reports are particularly well chosen and the illustrations are well reproduced. This method of studying electrocardiograms is helpful not only to the beginner but to those physicians who have had experience and wish to improve their interpretative knowledge.

BRUCELLOSIS (UNDULANT FEVER) CLINICAL AND SUBCLINICAL. By *Harold J. Harris*, M.D., Health Officer, Westport, N. Y.; Consulting Physician, St. Lawrence State Hospital; Attending Physician, Elizabethtown Community Hospital; Lieutenant Commander, Medical Corps, United States Naval Reserve; Member, New York Academy of Medicine; Associate Member, American College of Physicians. Foreword by *Walter M. Simpson*, M.D., F.A.C.P., Director, Kettering Institute for Medical Research, Miami Valley Hospital, Dayton, Ohio. Cloth. Pp. 286, with 6 illustrations. Price, $5.50. New York and London: Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, 1941.

Undulant fever, originally called Mediterranean fever or Malta fever by Bruce, who discovered its microorganism in 1886, was first recognized in the United States in 1904 but until recently little attention was paid to it from the standpoint of public health, although it was estimated in 1928 that ten per cent of the population in the United States became infected with it. Great credit is due to the author, a practitioner in a rural area, far away from adequate laboratory facilities, for having been able to concentrate his interest on the health problem of brucellosis in its acute and chronic form and to proffer the present day knowledge about it in a well written, concise and well illustrated monograph.

Following an historical introduction the etiology, epidemiology, pathology, symptomatology, diagnosis, prognosis, treatment and prophylaxis of the disease are ably discussed. The physical therapeutic aspects of the treatment, especially that of fever therapy are recognized by the author, himself an active fellow of the American Congress of Physical Therapy. As Harris states the first requisite toward discovering how high is the actual incidence of brucellosis is the knowledge that the disease exists, the second is the routine performance and correct interpretation of the various tests. Acute cases of brucellosis are often mistaken for typhoid fever, while chronic cases may masquerade under the symptoms of atypical and persistently recurrent arthritis, colitis, nephritis, pyelitis, "muscular rheumatism," neuritis, and the like. Dr. Harris' clear-cut and authoritative monograph deserves the attention of all practicing physicians and its perusal should enable them to render better medical service to a large mass of the population suffering from a hitherto undiagnosed and consequently not so very well cared for malady.

ANATOMY AND PHYSIOLOGY. By *Frederic T. Jung*, Assistant Professor of Physiology and Pharmacology, Northwestern University Medical School; Member of Visiting Staff, Norwegian-American Hospital, Chicago; *Anna Ruth Benjamin*, B.A., M.D., Staff Physician, The Menninger Sanitarium, Topeka, Kansas, formerly Resident Physician, Elgin State Hospital, Elgin, Illinois; *Elizabeth Carpenter Earle*, B.A., R.N., Educational Director, School of Nursing, St. Elizabeth's Hospital, U. S. Department of Interior, Washington, D. C., former President of the District of Columbia League of Nursing Education. Cloth. 367 illustrations. Pp. 666. Price, $3.50. Philadelphia: F. A. Davis Company, 1941.

In the space of thirteen chapters, called units, there is presented the subjects of anatomy and physiology, physiology being the keynote of the text, but anatomy its framework. At the end of each chapter will be found suggestions for laboratory practice and study projects. Following the introductory chapter are units discussing the osseous system, or the erect body; the muscular system—the moving body; the nervous system, integration and control of the body; the circulatory system, maintenance of cellular metabolism; respiratory system, the air line of the body; endocrine system-governor and regulator of the body; integumentary system-covering of the body; alimentary system or maintenance of nutritional needs of the body; excretory system—waste disposal of the body; sensory organs or guardians of the body; the reproductive systems or perpetuation of the species. Each chapter contains a preview and each topic has its own preview. Many of the illustrations are colored, to bring out the detail to better advantage. One feature we must mention is that the columns are two to a page. While primarily planned as a textbook for schools of nursing, this volume can be highly recommended to those engaged in medical technical assistance who are in need of a text or a reference book for anatomy or physiology.

STATISTICAL CALCULATION FOR BEGINNERS. By *E. G. Chambers*, M.D., Assistant Director of Research in Industrial Psychology, Cambridge; Fellow of the Royal Statistical Society. Cloth. Pp. 110. Price, $2.00. New York: The Macmillan Company, 1941.

The author states that his purpose is to explain as simply as possible how to perform the calculations involved in the commoner statistical methods. No assumption of mathematical ability on the part of the reader is made; the calculations described involve the use of arithmetic only. The book is chiefly intended for students of the biologic sciences, but the methods described are fundamental to statistical work and should prove useful to anyone who has to make use of elementary statistical methods. Many of us no doubt have been called on to participate in a certain amount of research work, either simple or advanced, and likewise have been handicapped by a certain lack of fundamental knowledge with which to interpret our results. Karsner and Goldblatt in their article in the "Handbook of Physical Therapy" on "Evaluation of Methods Used in Physical Therapy," direct attention to the fact that it will be necessary in many instances to fall back on the statistical method. Since this does permit of opinions on the part of the observers, the number of observations must be multiplied so as to decrease this particular factor of error. This error can be practically eliminated by objective evaluation of the effects without knowledge of the type of treatment used. Strange to say, this critical part of the statistical method is rarely practiced in investigations on patients but is commonly used in experiments carried out on animals. It is the only method that is likely to lead to logical, sound and probably correct conclusions. For these and also for those who like to add to their knowledge this small volume can either be an essential helpmate or an intellectual pastime.

MASSAGE IN NURSING CARE. By *Kathryn L. Jensen-Nelson*, M.A., R.N. Formerly General Director of Physical Therapy Instruction to Students in Washington Sanitarium and Hospital School of Nursing, Takoma Park, Maryland, and in Thirty Allied American and Foreign Schools of Nursing. Second edition. Cloth. Pp. 152 with 26 illustrations and charts of superficial muscles of the body. Price, $2.00. New York: The Macmillan Company, 1941.

This book has all the indices of having been written by a student who had the "feel" of her subject, and one who attempted to express her convictions along the practical lines that would best guide the nursing profession in the art of massage. The second edition retains the outstanding virtue of this manual; namely, its lucid and literary conciseness—a style which tends to create a better understanding, enthusiasm and conviction in the remedial and supportive qualities of massage for therapeutic purposes. As part of collateral study, the author has managed to reduce a good portion of the massive literature to an informative bibliography. She has also provided a pertinent questionnaire at the

beginning of each chapter, which will challenge the student and stimulate the instructor for the mutual benefit of arriving at a more quantitative knowledge of the facts and values of massage. The very "feel" of her subject is indicated by her selection of an inspiring four stanzaed poem placed as a frontispiece, which might well be memorized by every masseuse as the very credo of her practice. It tells of the beauty of strong hands, firm hands, sensitive hands, kind hands—hands that are a solace to the sick and the invalid, and are an anodyne to those wracked with pain—hands that have compassionate understanding because they are used with purposive intelligence. The exposition is couched in that clear and sincere style that holds the interest of the student, and thus manages to present the principles of massage in a manner highly satisfactory for teaching purposes. In the space of eight chapters this small volume presents the history, rules, physiologic effects and procedures of massage, its general and special application as well as certain exercises of an adjuvant but practical character. In these days when massage has become a measure recognized and taught by both the medical and nursing profession because of its known supportive and remedial virtues, it is gratifying to call attention to this well knit contribution and to recommend it to the nursing guild as a manual that expresses the best traditions of the medical profession.

THEORY OF OCCUPATIONAL THERAPY FOR STUDENTS AND NURSES. By *Norah Haworth*, M.A., M.R.C.S., L.R.C.P., D.P.M., Late Senior Assistant Medical Officer, Severalls Mental Hospital, Colchester; Hon. Assistant Physician, Lady Chichester Hospital for Functional Nervous Diseases, Hove; and *E. Mary MacDonald*, Principal, Dorset House School of Occupational Therapy, Occupational Therapist in charge of the Allendale Curative Workshop, Bristol. With foreword by Sir *Robert Stanton Woods*, M.D., F.R.C.P., Consultant Adviser in Physical Medicine to the Ministry of Health. Cloth. Pp. 132 with 81 illustrations. Price, $2.00. Baltimore: William Wood & Company, 1941.

Physical therapy and occupational therapy each have their place in rehabilitation from disease and injury. The author emphasizes that occupational therapy is only part of general therapy. The place of work and play in hastening the recovery in patients suffering from mental disorders, tuberculosis and cardiac conditions is discussed. The methods of restoring function of joints and muscles in surgical and orthopedic conditions are described. It is shown that the amount of help which a patient may obtain from occupational therapy depends, to a great extent, upon the occupational therapist. There is an excellent chapter on the finance, equipment, stocking, storage and the use of waste materials in an occupational therapy department. A bibliography is included in which references are given, not only to books dealing with occupational therapy but also to other books on allied subjects in which students may find information of value to them in their work. This book can be recommended to those interested in occupational therapy.

OUT OF THE TEST TUBE. By *Harry N. Holmes*, Ph.D., Oberlin College. *Author of*: Have You Had Your Vitamins? General Chemistry, Introductory Colloid Chemistry, etc., etc. Third edition. Cloth. Pp. 305 with 102 illustrations. Price, $3.00. New York: Emerson Books, Inc., 1941.

This completely revised third edition about the marvels of chemistry is an up-to-date account by an outstanding authority of the extraordinary influence of chemistry on modern civilization. It embodies a new chapter on "Stragetic Raw Materials" which certainly is as timely a topic as it is appropriate for present day consideration. The work reviews the extraordinary achievements of chemistry and compresses its fascinating story into a thrilling drama that should make us glow with pride because we belong to a profession that has been an associate in the progress of this discipline. Written by an internationally famous scholar, Harry Nicholas Holmes, Professor of Chemistry of Oberlin College, it is presented in that informal literary style that renders the theme into a vivid and breathtaking story of the far-reaching influence of the contribution of chemistry on modern life—its food, health, habits, jobs, environments—nay, our very future and national defense. It is a work that can well be read with profit by youth and adult, and with equal zest and enthusiasm by those who seek predigested knowledge to assuage the spiritual or intellectual hunger of the inquiring mind. It touches upon the mystery and magic of the chemical laboratory and becomes the engrossing story concerning a distinguished group of chemists in the domain of modern civilization. Its educational value lies in the fact that it presents in interesting detail the major and important discoveries as well as their practical implications of the thousand of astonishing facts concerning radium, yeast, vitamins, hormones, rubber, chemical dyes, petroleum, coal, alcohol, sugar, the soil, the air, cellophane, silk, rayon, steel, insects, bacteria, fats, medicine, various rays, synthetic medicinals, air conditioning, nutritional products, products of solar and artificial energy, and the like. It is a thrilling story of the lives of famous men, lavishly sprinkled with teeming facts. Indeed, this work is undoubtedly the most interesting exposition of the contribution of chemistry in popular narrative style since the publication of Slosson's "Creative Chemistry" that has come to our attention. We enthusiastically endorse its informative and entertaining value to that wide group of readers ranging from adolescence to senescence.

PHYSICAL THERAPY ABSTRACTS

Brucellosis (Undulant Fever). Walter M. Simpson.

U. S. Naval Medical Bulletin **39**:339 (July) 1941.

The author's prediction of a decade ago, greeted with some skepticism at that time, that brucellosis would become recognized as a public health problem of major proportions has been fulfilled. Of the 248 cases of brucellosis studied by the author, all but 52 occurred prior to the passage of a universal pasteurization ordinance in 1931. In each of the 52 cases occurring during the past 10 years the patient had consumed raw milk elsewhere prior to the onset of illness.

The symptomatology of the acute and the chronic forms of brucellosis varies greatly. The diagnostic criteria for acute brucellosis are usually not applicable to the chronic form of the disease. There is little doubt that the chronic ambulatory form of brucellosis is widely prevalent, is often confused with other diseases, and frequently is not recognized. Many "neurasthenics" and patients with so-called "fever of unknown etiology" have been found to be victims of chronic brucellosis. Less than 10 per cent of patients with chronic brucellosis have experienced a previous acute febrile illness, compatible with a diagnosis of acute brucellosis.

The only diagnostic procedure by which the diagnosis of brucellosis may be established with certainty is the cultivation and identification of the organism. The agglutination test and the cutaneous test are of considerable value in the diagnosis of acute brucellosis, but these procedures are inadequate as diagnostic aids in cases of chronic brucellosis. A positive agglutination test, particularly of low tier, and a positive cutaneous test do not indicate that the person is suffering from brucellosis at the time the tests are made. Both the agglutination test and the cutaneous test will yield entirely negative results in an appreciable number of persons from whose blood Brucella may be recovered.

In the experience of the author, the opsonocytophagic test has yielded a high proportion of inconsistent results, and he has found this test to be of little or no value as a diagnostic procedure or as a guide to therapeutic response.

Since it is now well established that brucellosis is caused most frequently by the ingestion of raw milk containing Brucella, the most important consideration in the control of the disease is adequate, controlled pasteurization of all milk and dairy products.

Brucella vaccine therapy has produced favorable results in from 60 to 85 per cent of patients with either acute or chronic brucellosis. Sulfanilamide and other sulfonamide drugs are apparently of little benefit. Artificial fever therapy has yielded favorable results, particularly in those refractory patients who did not respond to vaccine therapy.

Therapeutic Relaxation. H. J. Behrend, and Jerome Weiss.

New York State J. Med. **41**:1838 (Sept. 15) 1941.

Tone is an essential feature of all living tissue. In health a normal tone is recognized. Deviation from the normal can occur in either direction. Decrease in tone results in the state variously described as atony or hypotonia. Increase in tone constitutes a hypertensive state. It is with the latter condition that we are chiefly concerned in this presentation. We must not confuse hypotonia with fatigue, as is very well described by Rathbone.

Deviations from the normal may be considered as primary and secondary. Primary deviations may be due to racial or individual characteristics. Some races are notoriously "high-strung"; others are definitely phlegmatic. However, individual variation is observed in which an individual may differ widely in muscle and nerve tone as compared to others of the same general racial group. Among secondary factors we must consider environment and training as the most important.

Rest is a valuable means of promoting true relaxation. Unfortunately many people have a strange conception of what constitutes rest. We are familiar with the spectacle of the vacationer returning weary and far from being fit to resume his work. The objective of many physical therapy measures is to secure relaxation. In hydrotherapy we utilize the warm bath and the continuous warm baths as frequently used in mental institutions. Partial and full body packs are also used as well as the arm bath of increasing temperature.

Light therapy, especially radiant heat, is also of value to induce relaxation. Conversive heating by means of short wave or conventional diathermy here have broad application.

Mechanotherapy in the form of massage, particularly in the form of superficial stroking, is effective to produce relaxation.

Acoustic stimuli play an important role in relaxation. Some noises we definitely recognize as soothing, such as the murmur of a brook and the calming influence of soft music.

Jacobson, of Chicago, has published an interesting method for producing relaxation of neuromuscular hypertension. He teaches his patient to become acquainted with the concept of tension by letting him contact certain isolated muscle groups. By consciously releasing this tension, the patient is taught the sensation of relaxation. The authors have sought a method to produce relaxation without the conscious cooperation of the patient.

It may readily be demonstrated that shallow or incorrect breathing will produce tension. Shallow breathing combined with impaired circulation reduces oxygenation of the blood. The tissues of the body suffer in consequence, further tension develops.

Experience has shown that we can produce relaxation by improving the respiration.

Breathing exercise, as compared with Jacobson's technic, may be freed from the activity of thinking. The diaphragm should set the rhythm for respiration, and the other muscle groups should follow its lead.

Following extensive study of the subject, the authors have established a technic for breathing exercises. The patient in his exercise suit is placed on a cushioned table in a comfortable dorsal recumbent position. He first exhales blowing through the pursed lips. This must be done without effort. Pursing of the lips is important as it has a remarkable effect upon the action of the abdominal muscles. The patient must now rest quietly and wait until natural inspiration occurs. This is an essential feature, and sometimes a difficult one, for the patient to master.

When properly performed, the inspiratory wave starts at the umbilicus and spreads to the pubis.

Disinfection by Light.

Ed. Brit. M. J. **4168**:707 (Nov. 23) 1940.

In the revival of interest in antisepsis during the past few years attention has been given to the possibilities of ultraviolet light as a sterilizing agent. The studies of Wells on the behavior of infected fluid droplets may be regarded as the starting point of this development; the case with which he sterilized artificially infected atmospheres by means of ultraviolet light was perhaps deceptive, as the particles formed in his experiments were of a different nature from those found naturally in the air. Others nevertheless have been encouraged to turn the method to practical account. Its most enthusiastic apostle has been Hart, who advocates irradiation of the field of operation in order to prevent air-borne infection in the operating theatre. Hart's conclusions appear not to have been unquestioningly accepted in the United States, and are considered somewhat critically in a cautious review of the subject of air-borne surgical infections by W. Walters and T. B. Magath. The flaw in Hart's argument is inadequate proof that the infections which his method is designed to prevent were in fact air-borne, and the inconsistencies which this assumption on his part involves. Failure to apply the coagulase test to staphylococci grown in plates exposed to air, and reliance, instead, on such deceptive characters as haemolysis and pigment production, have given a grossly exaggerated picture of the numbers of pathogenic staphylococci liable to be present in the air. The careful quantitative studies of E. A. Devenish and A. A. Miles showed that the risk from this source is small, and revealed on the other hand that very heavy staphylococcal contamination of an operation wound can occur from the surgeon's skin through minute and undetected perforations in his gloves. The whole of Hart's work needs to be reviewed in the light of these observations, and other possible explanations sought for the favorable effect of irradiating the field of operation.

Hart's method of directly irradiating an operative field needs to be distinguished from a method of applying ultraviolet light which has come into more general use, and consists of treating the entire atmosphere of a room by means of tall lamps directed upwards. This proceeding obviates the need for protection to the eyes or skin of occupants, and depends on the assumption that upward air currents will continually bring the lower air strata within the effective range of the lamps. If by such means the pathogenic bacterial content of air can be substantially reduced this method of treating air has obviously almost unlimited possibilities of application, not only in such places as wards and out-patient departments of hospitals, where serious risk of air-borne infection of many kinds may exist, but in crowded premises and public rooms, and, indeed, in any enclosed space the atmosphere of which is liable to undue pollution from the air passages of its occupants. If ultraviolet irradiation applied in this way is a really efficient preventive of air-borne infection it represents a hygienic advance of importance. Much remains to be done in studying the capacity of such lamps to reduce the dangerous bacterial content of air, not only under controlled laboratory conditions but in the more difficult and varied circumstances of practical use. Another type of evidence which will have to be furnished is that of reduction in the frequency of illness due to air-borne infection.

Ultraviolet irradiation has a place in the treatment of established infection. There is no doubt of the benefit sometimes to be gained by irradiating an infected surface, but there is some difference of opinion on the mechanism of the effect. The irradiation is destructive to bacteria fully exposed to it under artificial conditions, but whether they are accessible by it in the fluid exudate of a wound or in underlying tissue is another matter. H. Paschoud, who strongly advocates the use of ultraviolet in the treatment of contaminated wounds for the prevention as well as the treatment of infection, considers that its effect is on the tissues rather than on bacteria.

Fluorescence Microscopy Applied to Ocular Tissues. John N. Evans, and Edward Singer.

Arch. Ophth. **25**:1007 (June) 1941.

The fluorescence of frozen ocular tissues has been examined in a dark field. A strong bluish autofluorescence has been observed in Descemet's membrane, the lens and the sclera. The other tissues showed fluorescence to a considerably lesser degree. Fluorescence could be imparted to the nonfluorescent tissues and the color of the fluorescent tissues could be changed by fluorochroming, which is a process similar to histologic staining. Fluorochroming consists of application

of greatly diluted, highly fluorescent compounds, dyes as well as colorless substances, to the tissues.

All substances used for fluorochroming in the present investigation were classified according to their electrical charge because, irrespective of their chemical characteristics, similar results were obtained with all members of the negatively charged group, and the positively charged substances always showed diffuse staining without any cell differentiation.

The negatively charged substances imparted fluorescence to the corneal epithelium, to the ciliary body and to the optic nerve. Among these substances, rivanol stained the nuclei selectively and thioflavine S stained the entire tissue.

Small droplets of vitamin A, which has a strong greenish yellow fluorescence, could be identified in the retina.

In the choroid of the cat a strong yellow fluorescent substance was seen. The fluorescence of this substance was uninfluenced by exposure to ultraviolet rays.

A Method of Irradiating Circulating Blood In Vitro With Ultraviolet Spectral Engery: Studies of Its Physiological Effects In Vivo Application In Humans. G. P. Miley.

Am. J. Physiol. **133**:388 (June 1) 1941.

A description is given of a Knott irradiation chamber, showing how, because of its construction with a baffle plate, labyrinthine system and enclosed in a metallic, quartz-windowed disk, an optimum turbulency is obtained and the heretofore insurmountable obstacles encountered in irradiating blood with ultraviolet spectral energy, namely, quartz window blood-film formation, and non-penetrability of this energy below a ½ mm. surface layer of blood, have been eliminated in vitro.

The technic of application of this in vitro method to in vivo work is next described, with mention of the source, the wavelength, and the intensity of the ultraviolet spectral energy used, time of exposure to the spectral energy, and amount of blood withdrawn, exposed, and returned to circulation — the amount being calculated according to the formula: $A = KW$, when A is the amount of blood exposed (in cubic centimeters), K is a constant equivalent to 1.5, and W is the body weight in pounds.

A study is presented of the immediate effects, produced in 119 humans by in vivo application of this method, on blood pressure, temperature, pulse and respiratory rates, these persons initially having blood pressure, temperature, pulse and respiratory rates within normal limits. No apparent significant changes have been found.

Studies of the effects of the in vivo application on the hemoglobin content, erythrocyte and leucocyte structure and count of the blood of 215 humans, made one to twenty-four months after initial application of the method show no essential variations, with the exception of an occasional rise in hemoglobin content, erythrocyte and leucocyte count from below normal values to normal limits and an occasional drop in abnormally high white counts to normal values.

Functional Treatment of Vertebral Fractures. H. Burkle-de la Camp.

Arch. f. klin. Chir. **200**:321 (Oct. 18) 1940.

Burkle-de la Camp discusses the relative merits of the Böhler treatment of vertebral fractures by reduction, fixation in plaster and exercises, and the functional treatment defended chiefly by Magnus. In the functional treatment the patient is kept recumbent on a thin mattress under which a board is placed. Heat is applied by means of a heating pad. From the third week on heat is applied with the patient in the prone position and the musculature of the back, excluding the region of the fracture, is massaged. Gymnastic exercises are begun. The patient is able to work after an average of one hundred and thirteen days. In the less severe injuries the time required for treatment is shorter (from six to seven weeks). The author analyzes the results obtained in a hospital in a mining region, in which during one year 230 fresh vertebral fractures were treated and in which annually from 500 to 600 old vertebral fractures were reexamined. After the reduction treatment there is a greater loss of elasticity than is the case with the functional treatment. The reduction treatment does not produce a more rapid improvement in the paralysis; it may even produce or intensify paralysis, because a bone fragment or a portion of the intervertebral disk may enter the vertebral canal and exert pressure on the cord. The prolonged wearing of a plaster jacket often weakens the patient besides producing unfavorable psychologic effects. The reduction treatment did not prove advantageous in the author's material. He considers prevention of gibbus formation an insufficient justification for Böhler's treatment and considers the functional treatment best. — (Abst. J. A. M. A. **116**:2443 [May 24] 1941).

The Fluorescence of Chlorophyll in Plants and Its Relation to the Induction Period of Photosynthesis. C. S. French, T. T. Puck, and J. Frank.

Am. J. Physiol. **133**:281 (June 1) 1941.

Both the fluorescence outburst and the induction period of photosynthesis which occur at the beginning of illumination of a leaf are due to the fact that the catalyst involved in splitting oxygen off of peroxides becomes inactivated in the dark. As a result, the photochemically produced peroxides accumulate and by oxidation, form substances which inhibit photosynthesis and increase the fluorescence yield. The substances are removed by a thermal reaction, so that the fluorescence intensity at any moment is determined by the balance between these two reactions. As photosynthesis proceeds, the catalyst in question is reactivated until it can remove the peroxides rapidly enough to avoid the oxidation processes. Evidence is presented by experiments wherein the light intensity is suddenly decreased after a very short, intense illumination, when the rate of disappearance of the substances causing the

resulting fluorescence outburst can be followed. Their lifetime can be estimated by measuring the initial fluorescence intensity after dark periods of varying duration. At room temperature, the half-life of these substances in the dark is 1.7 seconds. HCN, an excess of CO_2 or low temperatures decrease the rate of the thermal reaction removing these substances, and so prolong the time of the fluorescence decay, as well as of the induction period.

The Place of Forcible Manipulation in the Treatment of Joints. M. Forrester-Brown.

Brit. J. Phys. Med. **4**:53 (April) 1941.

The decision to resort to forcible manipulation has to be guided, as in other forms of therapy, by accurate diagnosis and in joint conditions the diagnosis is as much an anatomic as a pathologic one. In many forms of arthritis it is impossible, even with the aid of roentgenograms, to be sure of the causative infection, or at any rate undesirable to wait till this is possible. What we must determine is which elements of the joint are responsible for the stiffness and to what extent these can be safely loosened by force. It is for lack of this precaution that a number of manipulations fail to produce satisfactory results, while a certain number prove disastrous, from such effects as the lighting up of an early, low-grade tuberculosis, or the fracture of an adherent patella, or atrophied bone-end.

The presence of tuberculosis is a contraindication to manipulation, even without anesthesia, but what is less well realized is that in its early stages it is often quite indistinguishable from other forms of mild arthritis. Therefore, if there is the slightest ground to suspect tubercle, manipulation should be postponed till it can be excluded, even if this entails months of delay. Every orthopaedic surgeon could record cases in which a limb has been lost and others when life has been lost after the forcible manipulation of a knee, hip, or spine, the seat of latent tuberculosis. In the writer's experience nearly every patient of adult tuberculous spine has been treated for some months, sometimes many months, under the title of lumbago, by rubbing and forms of heat, before even a roentgenogram was considered necessary; and some of the patients had remissions and returned to work, which made the diagnosis more difficult.

Orthopedic Considerations in Poliomyelitis. C. Fred Ferciot.

Nebraska M. J. **26**:173 (May) 1941.

Clinically the treatment may be divided into that of the acute, the convalescent and the chronic stages.

A. Therapy during the acute stage. Protection of the affected muscles by placing the adjacent joints at rest in a neutral position. Carefully applied pillow splints may be effective in older children and adults, where alert nursing care is available. In general, however, the use of splints, either of plaster of Paris or of metal construction, affords more constant and effective protection and simplifies the nursing care. A Bradford frame is very useful when there is involvement of the trunk, and in all cases a firm mattress is to be recommended.

B. Therapy during the convalescent stage. (1) Continued protection of the affected muscles. (2) Carefully graduated physical therapy and exercise programs to minimize muscular atrophy and circulatory stagnation. Regular and individualized medical attention is necessary to properly coordinate these activities and to avoid over fatigue of the affected muscles. (3) The general health should be maintained at as high a level as possible.

It is important to appreciate that the return of function to an injured horn cell may not occur until between one to three years after the onset of the sickness, and hence continuous protection to the affected muscle groups must be continued through this time. Failure in this point of therapy often results in permanent loss of function in these cases of grade three involvement. Even after apparent recovery of a paralyzed muscle has occurred, over fatigue, through too rapid an increase in activity, may result in a return of muscle weakness.

C. Treatment of the chronic stage. Adequate treatment during the acute and convalescent stages will reduce to a minimum the occurrence of residual permanent paralysis. The aim of therapy at this stage is rehabilitation. In so far as possible the patient should be made independent of braces by adequate operative treatment. In many instances it is possible to eliminate their necessity entirely by operative procedures of proven value, and thus to remove the physical and mental stigmata that the patient comes to associate with them. The importance of a coordinated program of orthopedic care, muscle reeducation, occupational therapy and vocational training cannot be stressed too strongly, as each plays its essential part in returning the patient to a normal way of life.

Muscle Testing Around the Shoulder Girdle. A Study of the Function of Shoulder-Blade Fixators in Seventeen Cases of Paralysis. Signe Brunnstrom.

J. Bone & Joint Surg. **23**:263 (April) 1941.

From the standpoint of etiology, the 17 cases chosen for the study are classified as follows: (1) injury or disease to the long thoracic nerve (one case), (2) injury to the spinal accessory nerve (four cases), (3) congenital muscular defects (seven cases), (4) muscle dystrophy (four cases), and (5) poliomyelitis (one case). These unusual types of shoulder palsy affect those muscles which connect the scapula and the clavicle with the main skeleton.

The object of this report is twofold: (1) to discuss positions and movements which to the greatest possible extent bring out isolated action of the shoulder-blade fixators and which make palpation of each muscle possible; and (2) to

show by actual examples the functional disturbances which accompany isolated paralysis of these muscles.

To avoid misunderstanding, the following definitions are given: Upward rotation of the scapula will mean that the glenoid cavity is turned upward while the inferior angle moves away from the spinal column. Downward rotation of the scapula will mean the reverse movement of the above. In complete downward rotation the inferior angle of the scapula is closer to the spinal column than the superior; bilaterally, the vertebral borders of the scapulae form the letter V. Tipping forward of the scapula will mean that the coracoid process is lowered anteriorly while the inferior angle protrudes backward.

Tests for individual muscles are described as follows: Isolated paralysis of the trapezius, even in subjects in which the whole muscle is absent, does not appreciably interfere with the elevation of the arm. The disability is marked only when the subject abducts the arm with the trunk inclined forward. Isolated paralysis of the serratus magnus causes far more disability than paralysis of the trapezius alone, as the subject is unable to elevate the arm above a horizontal position. Paralysis of both the trapezius and the serratus magnus causes a very serious disability. The scapula completely lacks fixation and abduction of the arm can only be performed to approximately 60 degrees. Isolated paralysis of the rhomboids or the pectoralis minor was not present in any of the cases studied. The effect of the loss of one of these muscles, therefore, could not be determined. In patients with weak rhomboid muscles, resistive adduction of the arm proves to be rather difficult, as the teres major pulls the scapula toward the arm instead of pulling the arm toward the scapula. Isolated paralysis of the levator scapulae was not found in any of the patients studied. When the upper trapezius is absent and the rhomboids weak, the subject has no difficulty in elevating the shoulder girdle against resistance. It seems, therefore, reasonable to assume that in normal subjects, too, the levator scapulae is the most important muscle for elevation of the shoulder girdle.

The etiology could not be determined with certainty in all subjects, but five groups were recognized: injury to the long thoracic nerve, injury to the spinal accessory nerve, congenital defects, muscle dystrophy, and poliomyelitis.

Effect of Heat and Cold on Gastric and Intestinal Motor and Secretory Activity. J. Dewey Bisgard.

In Society Proceedings, J. A. M. A. **116**:2427 (May 24) 1941.

In a series of patients kymographic records were made of gastric and intestinal tonus and peristalsis in response to the application of hot and cold packs to the abdominal wall and to the ingestion of hot and cold water. The motor activity was registered on indwelling inflated balloons connected to Miller-Abbott tubes. Records of the large intestine were obtained by threading balloons into the colon through colostomy openings. Applied externally, cold increased peristalsis and tonus of the stomach and bowel and caused a sharp rise in gastric acidity. Cold applied internally, by drinking ice water, produced the reverse effect. Heat applied externally decreased tonus and peristalsis, but when applied internally by drinking hot water it increased tonus and peristalsis.

Electrical Convulsion Therapy. A. M. Wyllie.

Lancet **2**:71 (July 19) 1941.

Twelve patients with involutional melancholia were treated; 3 recovered and were discharged; 2 recovered and are convalescent, one of these being a 56-year-old woman who had been ill for more than twelve months, and the other a woman aged 59 who had been ill for more than two years. Six chronic patients showed improvement and another patient improved but relapsed. This recovery rate cannot be fairly compared with the spontaneous recovery rate, because the cases treated were selected as being severe and unpromising. Eighteen cases of schizophrenia were treated; only two had been ill for less than a year, of whom one recovered and the other recovered and relapsed and was transferred to the insulin department. Of 9 chronic hebephrenic patients 6 improved and 3 showed no change. One psychopathic schizophrenic improved in behavior although there was no essential change in her mental condition. Four chronic catatonic patients improved in behavior and became more amenable and sociable. Two chronic paranoid patients improved, but suffered a partial relapse later. Of these patients suffering from manic depressive psychosis, 2 were melancholic and 1 manic; one of the melancholic patients, a girl of 24, recovered after 6 treatments, all of which produced fits, mental improvement being manifest from the first treatment. The other was a woman of 28 who showed only slight improvement after each effective treatment; she had a high threshold and only 3 out of 8 treatments were effective in producing major convulsions. In one patient of long standing involutional melancholia (seventeen years duration) a woman of 64, and in 2 patients with senile melancholia women of 65 and 67, the patients were restored to a condition in which they could enjoy their lives and take an interest in affairs. A woman of 34 suffering from a severe psychoneurosis with suicidal and hysteric tendencies recovered and relapsed, and is still under treatment.

Lupus Vulgaris. With Special Reference to Its Treatment With the Finsen-Lumholt Lamp. Robert Aitken.

Brit. J. Phys. Med. **4**:66 (May and June) 1941.

The relation between tuberculous glands and lupus must be stressed. In an examination of 270 to 280 cases the writer found almost 50 per cent followed cervical adenitis. These are minimum figures, as in many cases the site of the lupus

made it certain that cervical glands had preceded the cutaneous disease. Van Vonno of Holland, in an examination of about the same number of cases, found scars of submental or cervical adenitis in 71.9 per cent of his patients with lupus.

Concentrated arc light is undoubtedly the best form of local treatment for lupus. Kromayer mercury vapor lamps have been and are still used, but the results cannot compare with those from concentrated arc light treatment, only 29 per cent of cures being recorded with the Kromayer as against 90 with the arc, which was the older model with which Finsen's name is associated.

Various modifications of Finsen's apparatus were made to try to overcome its disadvantages, but they were not successful till Lumholt's modification was introduced.

Lumholt's modification contains several differences from Finsen's lamp. In the latter arc, the concentration system and the compression system were three separate units, whereas in the former they are combined to form one unit and remain so no matter how much the lamp is tilted during treatment. The axis of the positive carbon is in the axis of the lens system and the carbon is automatically moved forward in this axis as it burns away. The movement of the positive carbon brings the negative carbon into adjustment.

The lens system is complex. There is a planoconvex part posteriorly and a biconvex hollow cylinder in front of it. The cylinder has a double tube on top. It is filled with a solution of cobalt sulphate which fills the inner tube. The cobalt sulphate solution cuts out the heat rays, and it is kept cool by having a stream of water circulating in the outer tube on top of the cylinder to which the warm solution rises. In addition, the whole cylinder is enclosed in a double metal jacket, and through this cold water flows.

According to the authors some of the patients treated have been free from all sign of disease for five to six years. It is unlikely that they will relapse and all are required to report at stated intervals. This follow-up of patients with lupus is of importance and has been in existence in the skin department for more than 20 years.

There is little doubt that the treatment with the Finsen-Lumholt lamp has opened a new vision of life for sufferers from lupus.

Some Common Causes of Painful Feet. Philip Wiles.

Practitioner **146**:389 (June) 1941.

In discussing chronic foot strain the author points out that relaxation of the muscles occurs when they are fatigued from such causes as prolonged and unaccustomed standing, a long illness or a rapid increase in body weight. The change from civilian to military life, and to heavy service boots, is a prolific cause of trouble at present. Whatever the reason for the muscular relaxation, the effect is to allow the foot to rotate into the valgus position under the influence of the body weight. Provided there is normal mobility this lowers the inner border of the foot and the weight comes directly on to the mid-tarsal bones. Mobility is the key to the problem of this type of painful foot. The supple foot, whether its habitual posture is arched or valgus, seldom causes any trouble. The foot that is stiff, whatever its shape, is liable to become painful when subjected to an unusual strain. The stiffer the foot, the smaller the margin of safety and the greater the risk of pain.

The pain is caused by tension on an injured ligament and it can therefore be relieved either by preventing the tension or by curing the injury. The first is achieved by wearing arch supports, which further restrict movement and prevent the weight from coming on to the ligaments. This is only palliative and is chiefly of use in those conditions in which there is no prospect of restoring a useful range of movements. It is not permitted for soldiers because of the difficulty in replacing supports during conditions of active service. The method of choice is manipulation, but it must be used with discretion. The object is to restore the range of painless movements by the rupture of adhesions and any new and painful scar tissue that may have formed in the ligaments. Manipulation is not used, as is often erroneously stated, to tear the ligaments themselves in badly contracted feet. Only sufficient force is used to rupture new scar tissue and this should be entirely inadequate to injure the structure of the ligaments. Manipulation must be followed by skilled massage and active and passive movements until the injury has resolved. When necessary, reeducation in muscular control must be given to correct any postural deformity, or other error in function, in order to prevent recurrence of the strain.

The successful treatment of anterior metatarsalgia depends on finding the underlying cause. The bruised joints will recover with complete rest and massage, but the trouble recurs rapidly if the cause is not removed. It may be that there is a faulty posture and gait which throw too much weight on the outer part of the foot—in normal walking the maximum strain, that is during the "take-off," comes on to the big toe. A deformity such as hallux valgus, hallux rigidus or hammertoe, may have the same effect. Examination of the sole of the shoe shows at once where the weight is being carried. In most instances, in addition to some other defect, the intrinsic muscles are weak, or out of action; the ball of the foot is then splayed, or may be concave, and the groove between the first and second metatarsals is absent. The first step in treatment is therefore to correct by operation any gross deformity and then to reeducate the intrinsic muscles to restore the shape and function of the foot. In some instances there is no gross deformity and the intrinsic dysfunction appears to be primary. The approach is then to provide what rest is possible—this usually means a pad and strapping, since rest in bed is seldom practicable—whilst muscular reeducation is proceeding.